

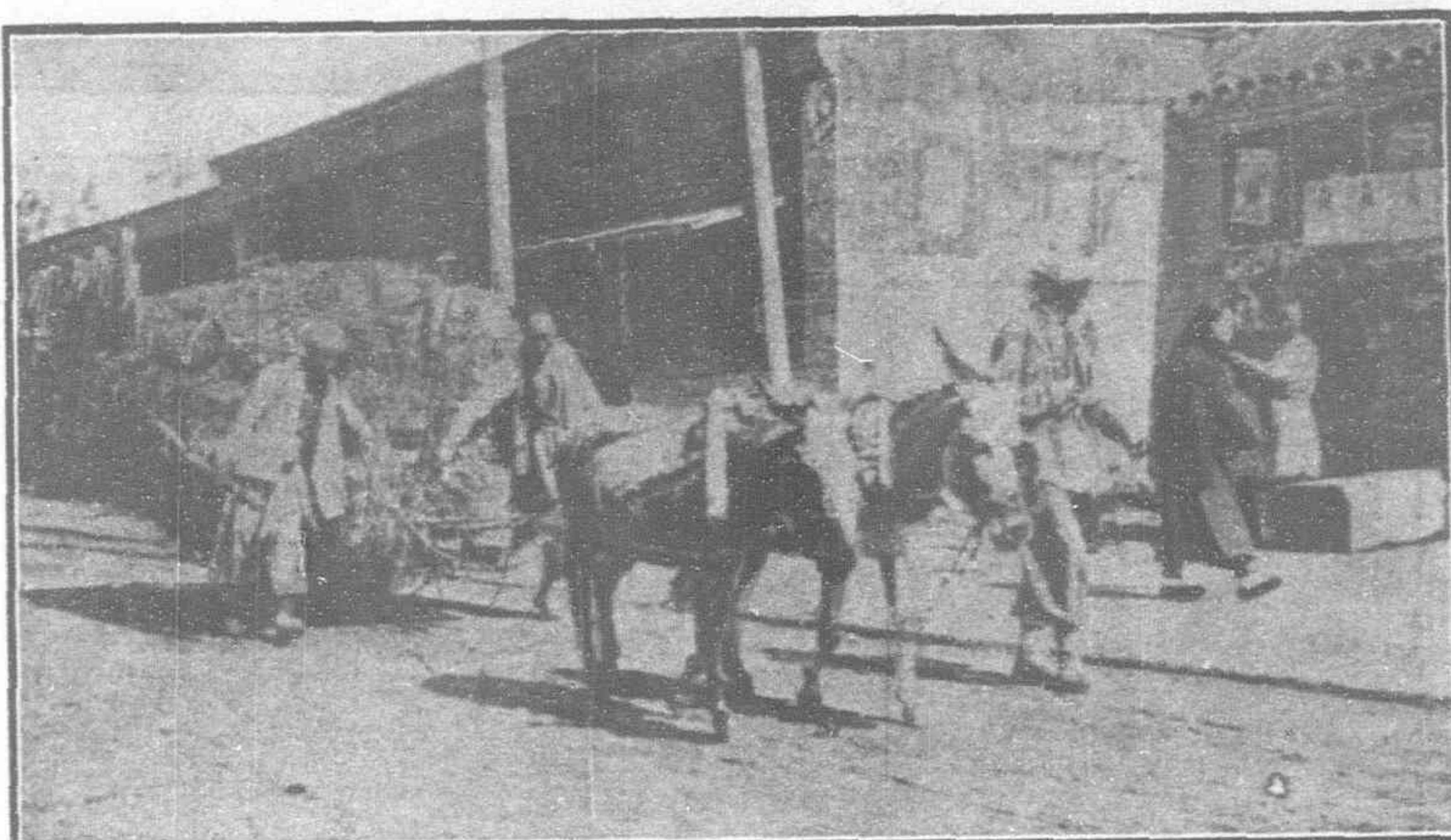
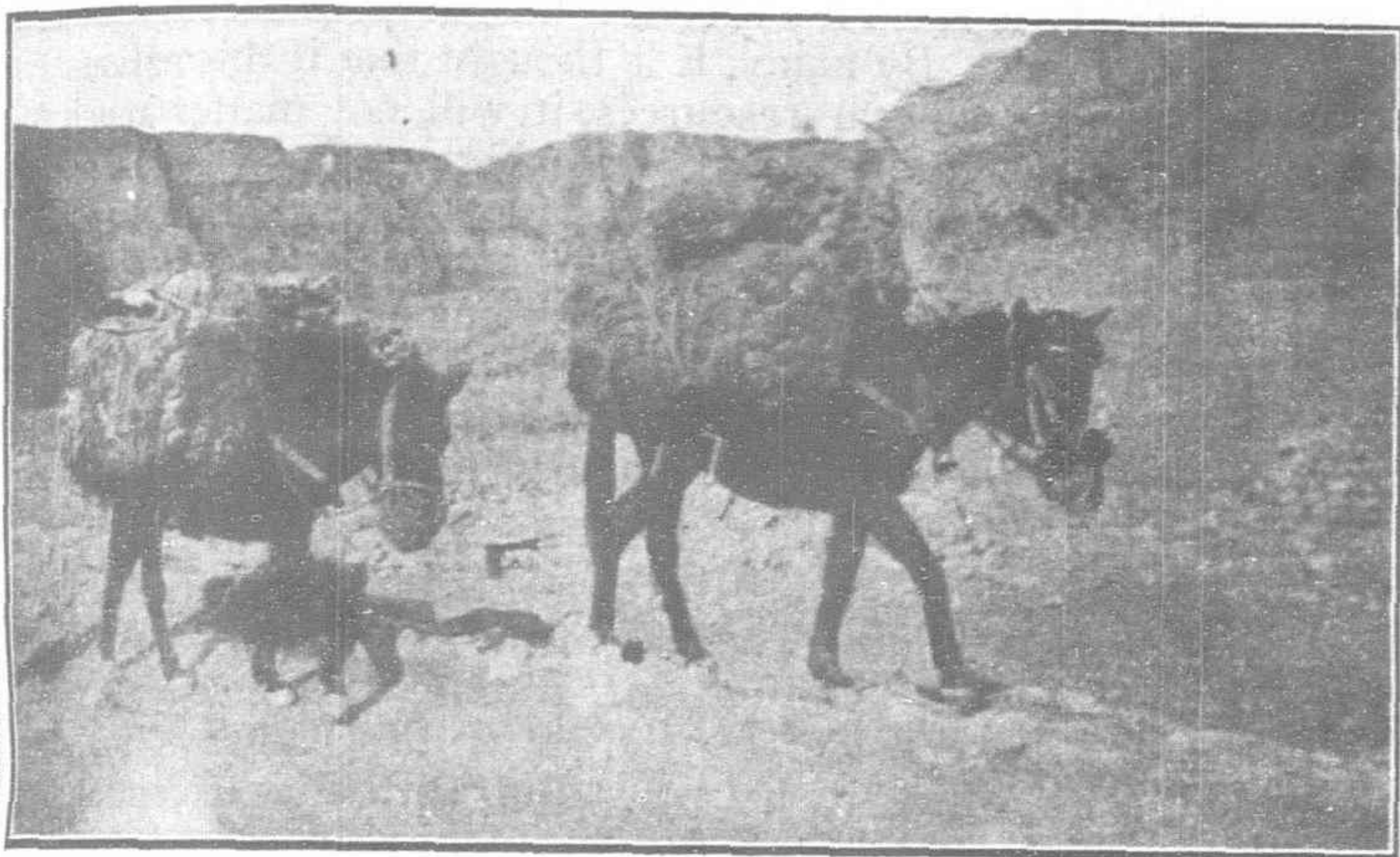
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PRIMITIVE MEANS OF TRANSPORTING FARM PRODUCE. PACK MULES AND DONKEY-DRAWN WHEELBARROW

The Partnership Between Railways and Agriculture in China

Why and How Government Railways Should Further Agricultural Development

The farms of China contribute the most valuable traffic in goods carried by the Chinese railways. The revenue from this traffic does not fall far short of that from all other sources combined. Taking the figures for 1915 as a basis, \$32,473,000 were earned by the Chinese Government railways from carrying goods. Of this, \$1,567,000 was in reality only a "paper figure" being assessed upon goods carried for the railways themselves. The remainder represents the actual commercial business. Out of this remainder, —\$30,906,000—agricultural products made up \$11,820,000, and animal products, which may be considered along with them, amounted to \$1,800,000, which was 44 per cent of the total commercial business.

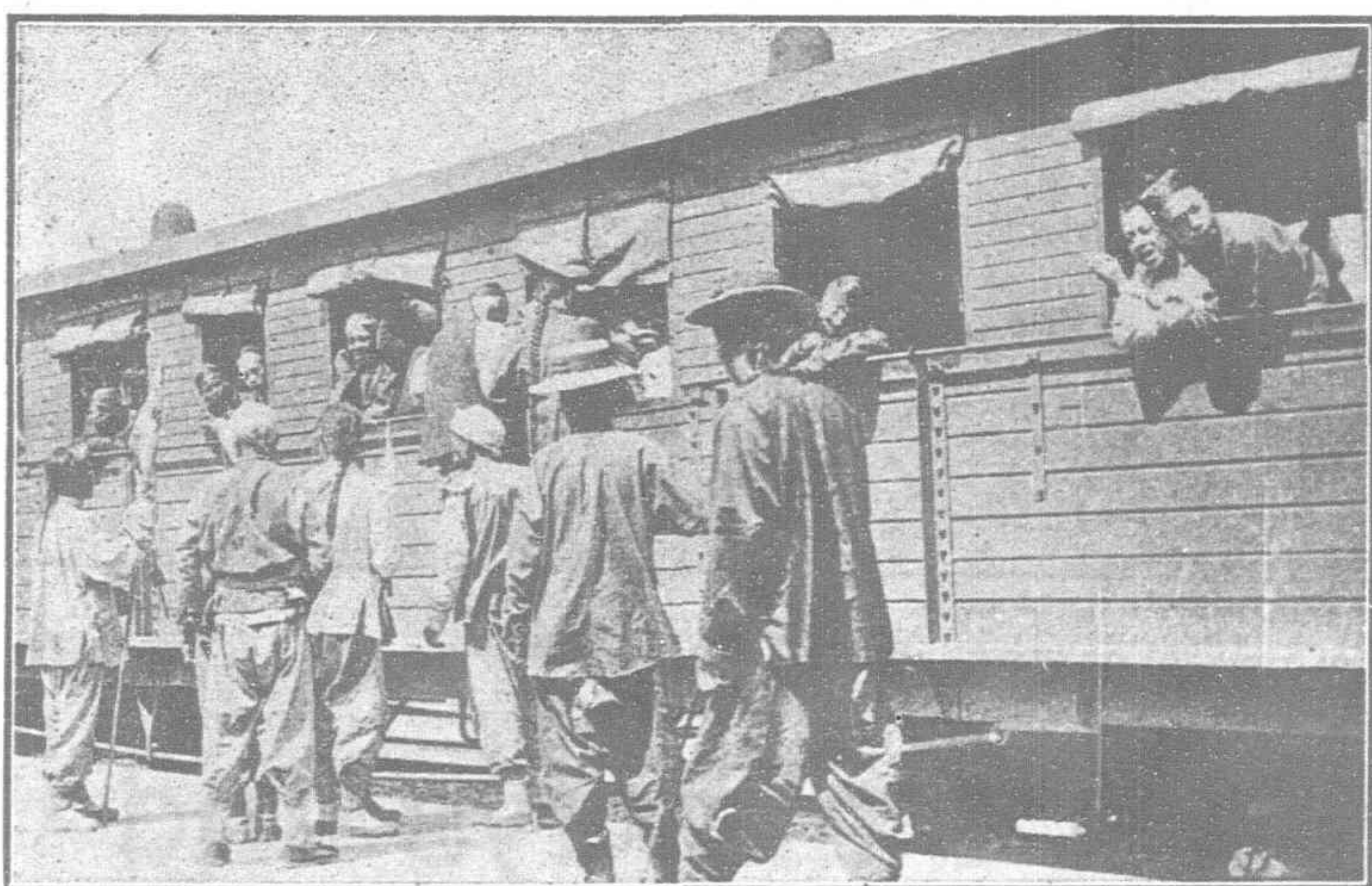
It is quite the fashion to urge branch lines to mining districts. And this is altogether proper. China needs development of her mineral resources. (And in a mining district, given a certain amount of standard machinery in place, the volume of traffic which will be derived can be predicted with substantial accuracy. Once the line is built and the machinery is in operation, the results are immediate.) But the present conditions seem to indicate that a similar amount of energy and ability applied to the development of traffic in agricultural products would bear very similar returns. This additional traffic, if composed of agricultural products, would be doubly profitable for it would not require additional investment of large amounts in branch lines and it would yield greater returns per unit carried. For, in 1915, although agricultural and animal products yielded \$13,620,000

in revenue compared with \$9,097,000 from mineral products, the railroads were compelled to haul 910,000,000 ton kilometers of minerals as against only 723,000,000 ton kilometers of agricultural and animal products. The haul on these higher class commodities averages nearly double that on coal, which is another factor making for profit. Of course there is a regularity in the flow of mineral traffic which renders it desirable, but very probably if the traffic were developed wisely and storage facilities provided properly, a similar regularity could be obtained in the movement of products from the farm. Certainly, there is as great a tendency for coal movements to pile up in the wintertime, as there is for farm products to move just after harvest.

Besides, it is very likely that mineral development will be very slow for the next half decade at least, and who knows how much longer? In Europe the accumulations of a century have been swept away in a few years of war, and the future is mortgaged beyond the ken of man to see the day of redemption. America proposes to put into the war each year double her usual annual production. Her own internal development meanwhile is standing still. Her railway system alone will require billions, so it is estimated. Tremendous hydroelectric projects are required to provide against her decreasing output of fuel oil. These were about ready to be launched when she entered the war. Irrigation and other reclamation plans will require huge sums. Electric traction, rural highways, municipal improvements, shipbuilding, and scores upon scores of more private projects are pausing



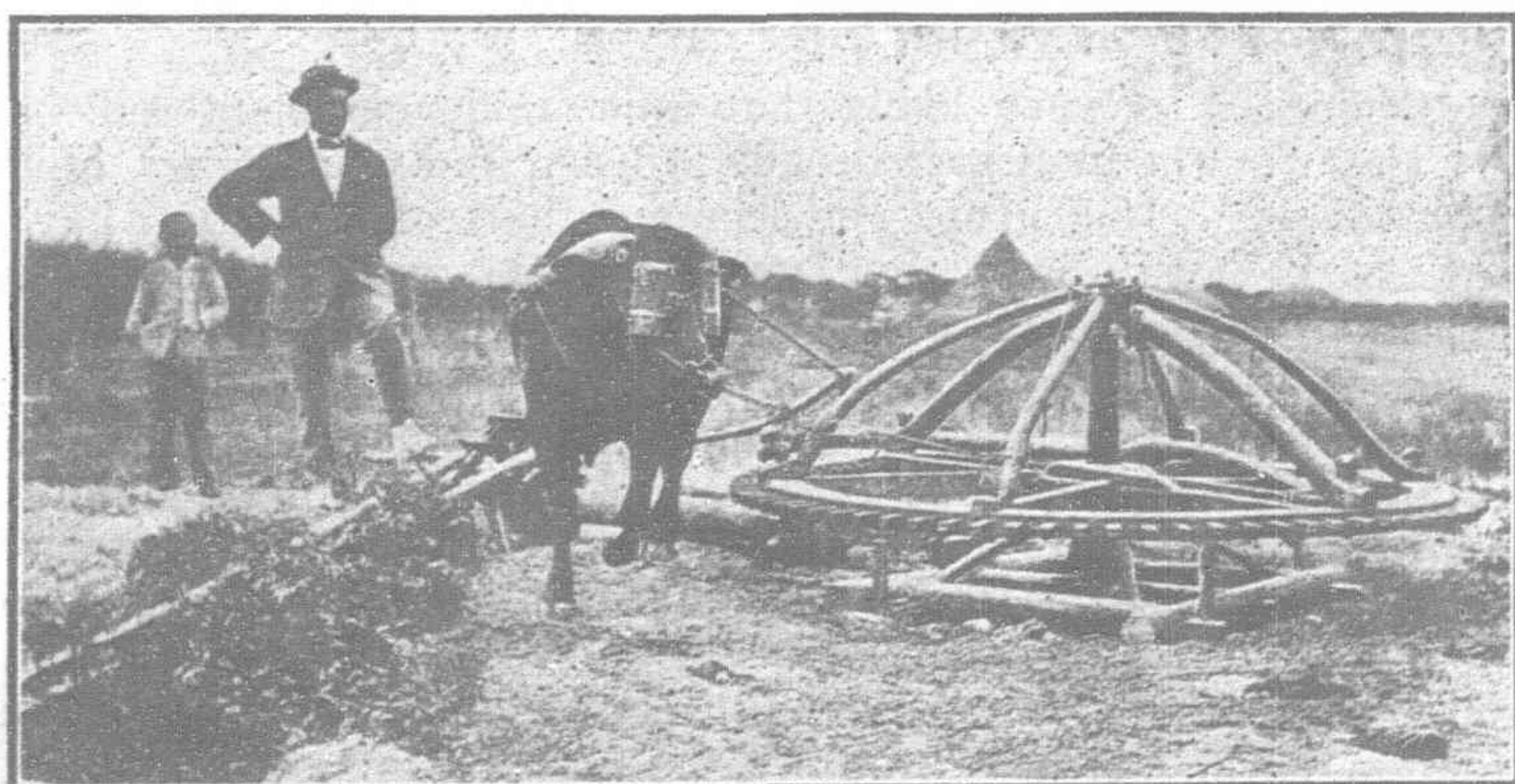
THE GREAT BEAN TRADE OF MANCHURIA IS WHOLLY DEPENDENT UPON THE RAILWAYS



THE NORTHERN RUSTIC PATRONIZES THE RAILWAYS, TRAVELING THIRD CLASS



PLOWING AND SOWING AS THEY DID IN CONEUCIUS' TIME



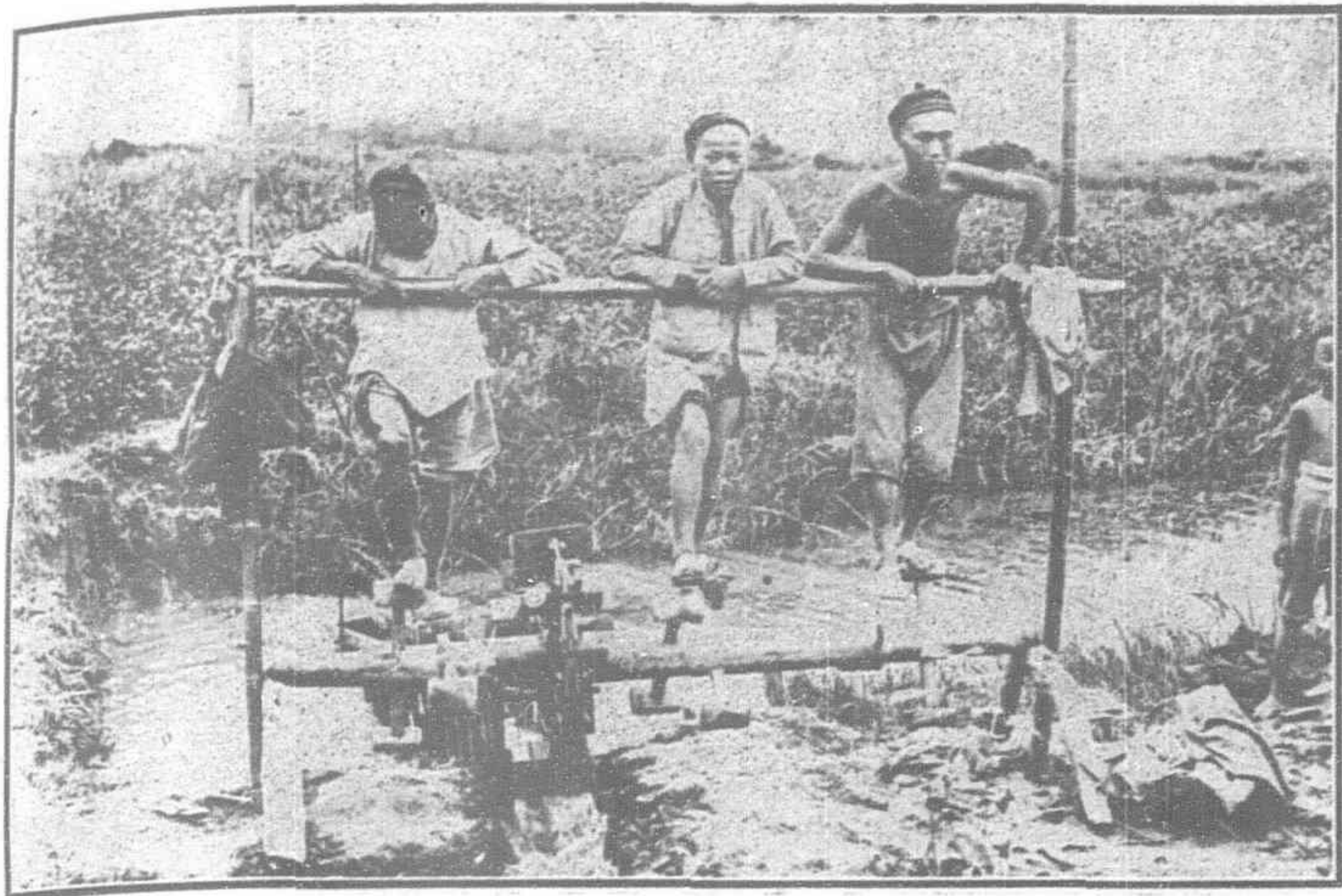
THE IRRIGATION WHEEL

merely long enough "to make the world safe for democracy." That accomplished, they will be in the market clamoring for their portion of investment funds. Americans first of all want to make America a pleasant place in which to live. In addition, experience proves that such investments pay. They are safe. They are governed by laws which are understood, whose enforcement can be depended upon, and whose interpretation is intrusted to courts which deal *out* justice rather than *in* it. There are no "commissions" to be paid to government officials. Business is transacted according to precedents which are familiar, and labor, although it may be independent and unruly at times, is efficient, intelligent, and for the most part honest. Not all of these things can be said for investments in China. Add the handicap of language, a currency system which is no system at all, and the frequent danger from bandits and revolutionaries, and it will be strange if the American investor can be interested very heavily in Chinese investments after the war. The only other possibility is from a nationality which is numerous but not welcome in China. By many, it is thought that if this nationality develops China's mineral resources, it will not matter much to China whether her railroads are profitable or not. Some Chinese capital is being joined with foreign capital for mining purposes, but there are very few purely Chinese enterprises. Mining is a large scale industry. Its capital requirements are too large for an individual investor to meet. Yet the corporation as a form of business organization has rarely been successful in China. The reasons for this need not be named, but they are nearly as potent to-day as at any time in the past.

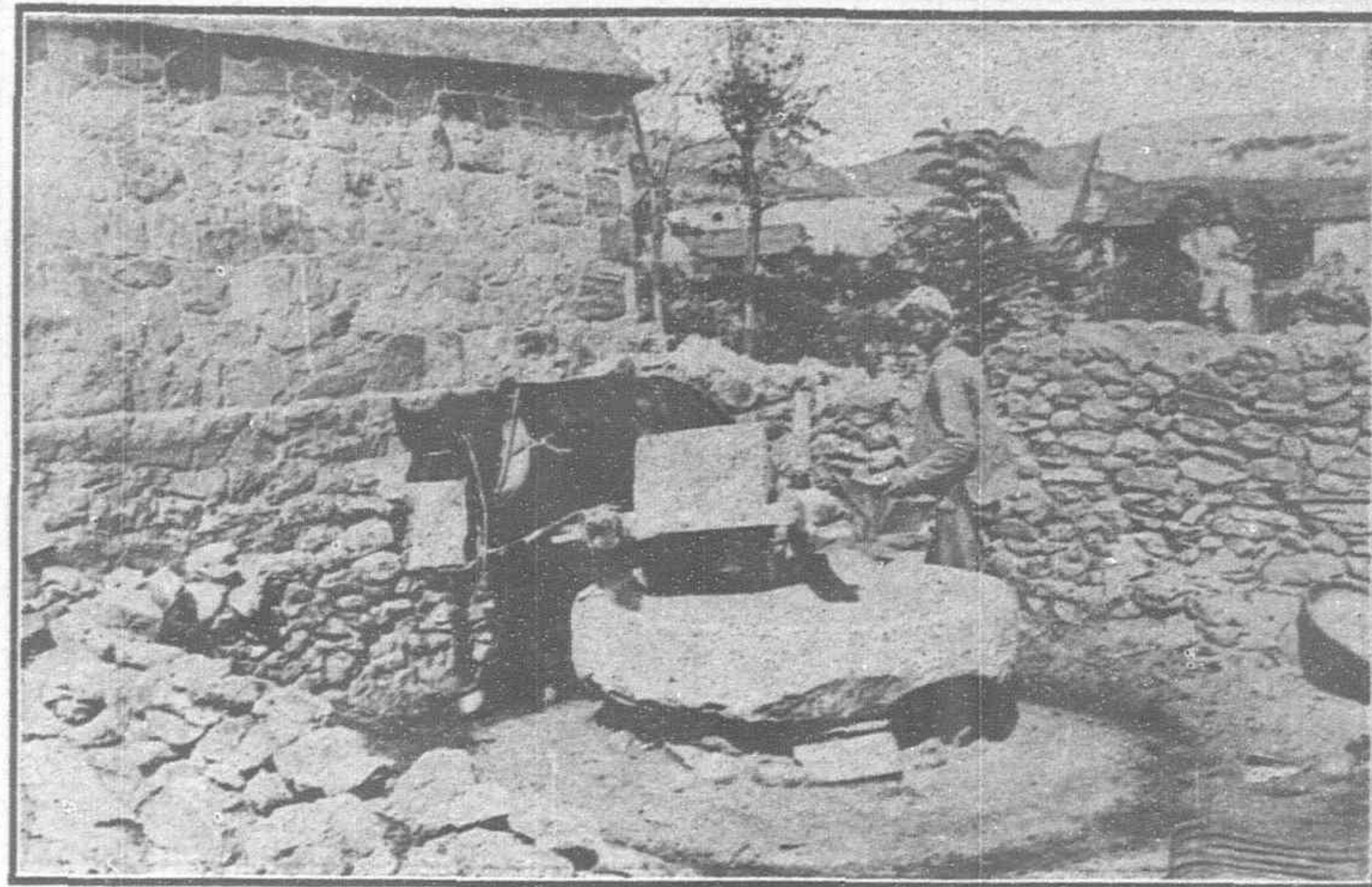
It is practically certain, therefore, that railway traffic cannot look toward mineral development for any considerable augmentation. It is admitted, of course, that mineral traffic would to-day be considerably larger if the railways had the equipment with which to haul it. But with that exception the farms of China remain as the source of increased railway earnings upon which most dependence can be placed.

In order to realize the possibilities in this source of traffic there will have to be a change in the point of view of those responsible for railway policy. In China the attitude of the railway official appears to be that his function is principally to produce a transportation service to meet the demands for it. But ambitious manufacturing concerns have found it profitable not only to produce an article or a service but also to create an increasing demand for their product. This has created within the past generation an entirely new profession,—the profession of salesmanship. This phase of railway activity is apparently ignored in the organization of the Chinese railways, as well as in those of some other countries. A few years ago the makers of a certain popular-priced motor car professed to be unable to build the cars as fast as the public wanted to buy them. Accordingly, they changed the title of their agents from "salesman" to "distributor." The Chinese railway organization provides distributors but not salemen. This may be proper enough if the demand throughout all seasons of the year is beyond the capacity of the railroad to satisfy. But it is significant that these motor representatives did not change their methods after their title was changed from "salesman" to "distributor." They continued to hunt up prospects, give rides to the possessors of likely bank accounts, furnish draymen, merchants, and professional men with estimates giving annual costs of doing their work with motors as compared with horses. And the employing company continued to give prizes monthly to the individual who "distributed" the most cars. With such a market worked up, it was not difficult to interest financiers in providing the funds with which to create a plan sufficient to supply the demand. That is the attitude which should be expected from the railroads of China. It will always be possible to devise means of financing purchases of additional equipment, if sufficient additional earnings from it are in sight.

The methods by which the tonnage of agricultural products carried by railways may be increased are various, but they may be grouped first under two heads,—(1) diversion to railways of present tonnage carried by waterways, and other routes of transportation, and (2) the creation of transportation tonnage which at present is nonexistent. The former involves salesmanship in bringing to the notice of shippers the regularity, the safety,



AN IRRIGATION TREAD MILL. BRAVN IS CHEAPER THAN EITHER
BRAINS OR MACHINERY



EVERY FARMER HIS OWN MILLER

the expedition of the railway service, and a constant watch upon operation to insure that the promises made in this respect are kept. It also involves a very painstaking study of rates, a judicious discrimination, perhaps, in order that no business is lost because the railroad is underbid at a price which would still leave a profit. This will involve, in many cases, a departure from the strict distance basis upon which the Chinese system of rates is grounded principally. No doubt there will arise many who will protest against what they will call the injustice of the discrimination against some communities in favor of others. The subject is too large for discussion here, but decision upon it will rest upon the answer to this question—Which is of greatest importance?—abstract justice or an increase in the well being of the community as a whole? For many years there will be little competition between communities as such and any difference in rate levels will have no competitive effect. When development brings the rivalry which has been so conspicuous a feature of railway disputes in Western countries, then safeguards may be introduced in China as they have been introduced elsewhere.

The creation of *additional* transportation tonnage is more important to the community, and perhaps also to the railways, than successful competition for *existing* tonnage. It calls for technical ability of a high order and a definite policy. It explains the phenomenal growth of railways in Canada and in the United States. Many of the methods which have proved successful there may be applied, with such modifications as are necessary, to conditions in China. These methods may be grouped under four heads—(1) adaptation of special kinds of equipment to the needs of products which now are marketed only in small quantities due to losses in transportation; (2) improvement in marketing arrangements to reduce losses, reduce distribution expense, and extend the area of consumption; (3) encouragement of specialization in production of particular commodities in regions peculiarly favorable; and (4) increase of output.

Increase of output has many phases. It depends primarily upon man power, available area, soil fertility, and the skill with which the man power is applied to the area and the soil fertility available. When one sees the one-wheel barrow used as the only wagon, because cultivation has crowded the highway down to a mere footpath; when one sees ponds and ditches yielding a crop, and mountain sides terraced to bear a harvest; when one sees how the filth of the cities and the excrement of a passing animal are all jealously conserved and carried back to the soil; when one sees the silt of rivers laboriously dug up and spread upon the fields, it would seem perhaps, that all had been done which skill and labor can do to produce a maximum supply of food for China. Possibly such is the case. Yet in every other line of human endeavor, among rigorous peoples, whenever the utmost limit had been reached supposedly, some new method has proved that only a beginning had been made. The human mind has admitted obstacles, failures even, but never limits. The idea that the Chinese farmer has reached the *ne plus ultra* of agricultural knowledge is as absurd as it is dangerous. No revolutionary methods are likely to offer much hope. But without doubt a



THE CHINESE THRESHER. BEATING OUT MILLET

multitude of small opportunities exist in which, by the application of skill and intelligence, improvement can be made.

In America the rising cost of living has directed attention to the phenomenal growth of cities. In 1880, the United States census showed the existence of two persons on the farms to feed every mouth in the cities. Thirty years later there were no more than one. An effort is being made there in the hope that not only can this city-ward tide be stemmed, but that an actual back-flow from the tenement to the land can be produced. In China nothing like this may be expected. The Chinese are essentially an agricultural people. Out of the whole population of 300,000,000 there are only a half dozen cities with a half million or more. There is no dearth of man power on the farms. Yet there is man-less land as well as land-less men in China. To get them together will require a program very similar to that so successfully used by the Canadian Pacific and other lines similarly situated. In Manchuria and in the territory north of the Great Wall toward Mongolia the population is comparatively sparse. There is a coolie movement each spring from the south into Manchuria and in the fall from Manchuria homeward. This movement brings in some revenue, perhaps half a million dollars, but it is carried at such low rates that there is little profit from it. This "bird of passage" movement, if converted into permanent settlement, would create a demand for goods traffic which would be far more valuable. It is urged that Chinese do not lend themselves to colonist schemes because they do not like to leave their old homes. The teachings of Confucius as interpreted by Mencius require a son never to go more than a day's journey from his parents during their lifetime. But the Straits Settlements, Hawaii, and California, contain abundant proof that wherever the Chinese can find an environment to which he can adapt himself the tenets of Confucianism do not stand in the way of an easier mode of life. In Canada and the western part of the United States, an area



PADDY FLOWING IN THE SOUTH



DRY FLOWING

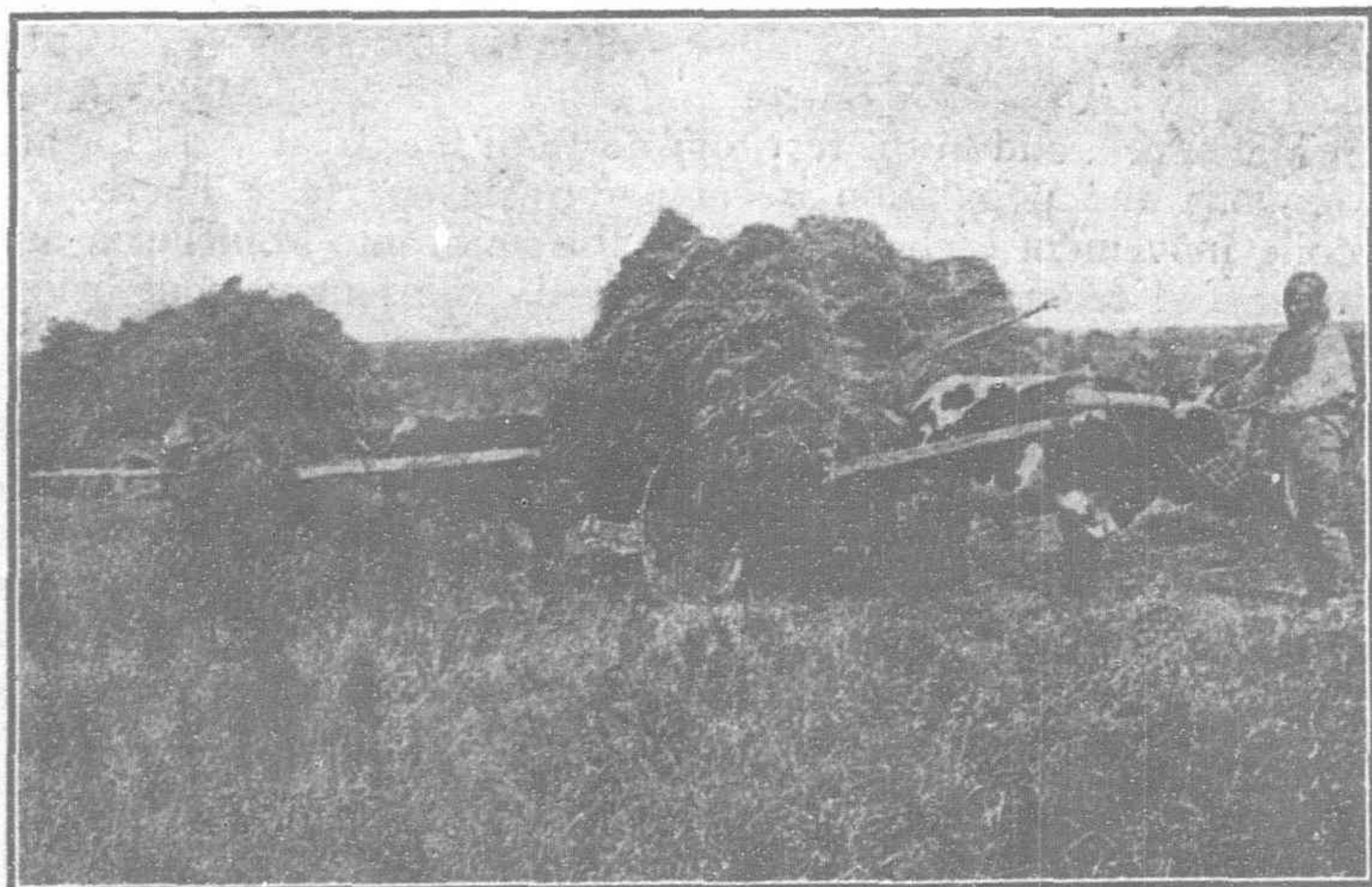
not much smaller than that of the Eighteen Provinces has been reclaimed from absolute savagery and made the home of prosperous millions, all within the space of fifty years,—due almost entirely to colonization propaganda by railroads. That method might be tried in China.

One reason why the Chinese farmer does not spread to these outlying districts may be found in the fact that the methods of farming which would be profitable there require some initial capital. If he possessed that capital perhaps the reason for migration would not be forceful. To meet a very similar condition the state of California has recently acquired some lands, at present unproductive. It will irrigate this land, build the necessary living quarters and stables, and stock it modestly. When all is ready, men who have the proper credentials as to farming experience, industry, honesty, and health will be allowed to take up these lands at cost under terms which provide low interest payments and ultimate ownership. The Canadian Pacific is offering a similar proposition in western Canada. Something very similar to this on a modest scale would seem to be feasible in the regions which have just been mentioned. The strategic value to the Government of such a colonization movement can scarcely be overestimated. But of course nothing like this can be expected from the Government at present. The only power that can possibly do anything of the sort is the rail lines which serve those territories.

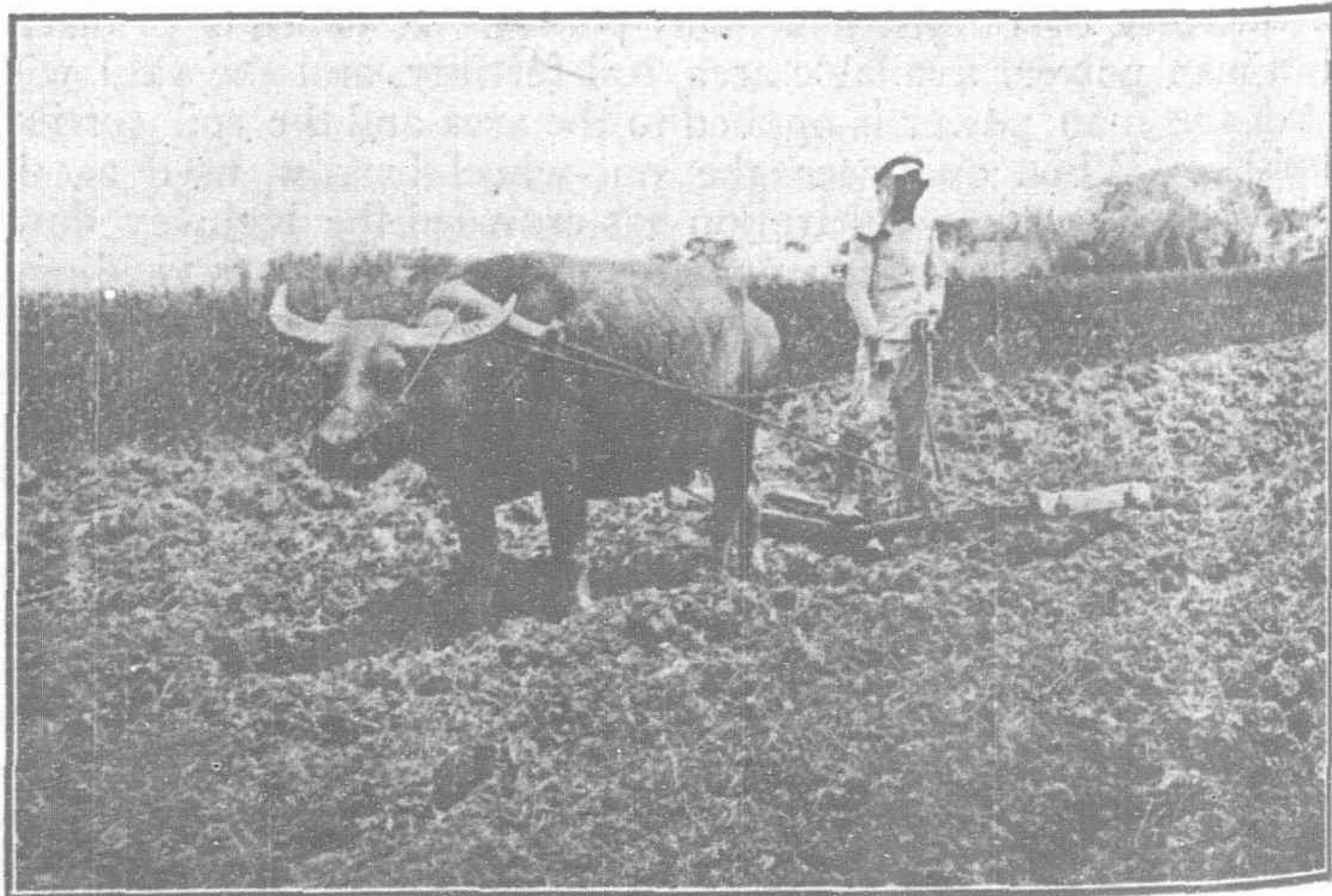
The hope of extending the area under production is rather feeble but not dead. Neither is the case for increased production hopeless. Great as their success has been in maintaining the fertility of the soil, Chinese farmers appear to be quite ignorant of the art of selective breeding both of animals and of plants. Improvement in varieties is as important in the question of yield as any other factor. The Chinese farmer can teach his Western fellow many things. But he also has a few to learn. A few examples will serve for many more. A Chinese apple has

scarcely enough flavor to have a taste of its own, let alone impart any to a pastry. The tree that produces it might just as well be producing a fruit which would add something to the world's store of good things to eat. The Chinese pony is a degenerate Mongol horse, and this degeneracy is due to the fact that he is the progeny of generations of yearling sires. A certain mining community not far from Peking has few eggs or food fowls, because this population has not learned how to keep chickens in health. A Chinese cow, which produces a quart of milk per day for perhaps five months in the year, eats just as much as a good Holstein, which will produce an average of fifteen quarts a day for ten months of the year. A Chinese cow will probably produce thirty pounds of butter in twelve months. There is any amount of Guernseys, Holsteins, or Ayrshires, which will produce three hundred pounds in the same twelve months. The same principles, the observance of which has resulted in such records of milk and butter production are equally applicable to the efficient production of beef.

But how are these facts to be translated into increased production? The farmers of no other country have done it unaided. They surely will not in China. The first duty of course rests upon the government. Hopeless? Well, rather! However, under the Republic there has been established a Cabinet department with a double-headed name, of which one head is agriculture. Under this department some experiments have been started to improve the grade of cotton. A foreign scientist was engaged to advise methods of introducing improved varieties, and although considerable friction marked his contact with the Chinese administration, considerable permanent results are in sight. Three experiment stations are engaged in a modest scale in improving the wool bearing qualities of sheep, by cross-breeding with Merinos,—a fine wool breed. Two of the same stations are experimenting with foreign breeds of cattle,—Herefords and Short Horns among the beef breeds, Ayrshire and



A MANCHURIAN HARVEST



HARROWING

Holstein among dairy breeds. It is fairly apparent that foreign cattle are resistant to Chinese conditions only slightly less than native cattle. However, the cost of foreign stock is so great that it is impracticable to import many female animals. Some crosses between imported males and Mongolian cows have produced calves of considerable promise. A small orchard has also been set out within the past two or three years with a view toward introducing improved fruits. The first results are what might be expected; namely, that a host of insect pests have destroyed a great deal. But sprays and germicides have conquered such enemies in other lands, and there is no reason to doubt that skill and perseverance can do as much in China if given the opportunity and time.

Missionaries have been doing something along this line. Their work in acclimating fruits at Chefoo is well known. Something of the same sort has been accomplished at Changlihsien. At Wofussu a beginning has been made under the auspices of the Y. M. C. A. There is a trained agriculturist at Nansuchow mission. The Tungchow dairy is well known in North China. Undoubtedly there are a great many more instances of the kind. At the University of Nanking announcement has been made of a course in silk culture. Students from all sections of silk producing provinces are invited to attend the course, bringing with them eggs from home. These will be attended by the student and developed in the manner followed in the student's home surroundings. It is expected that by trying the more successful methods upon other eggs from the less successful regions, improved methods can be discovered, and China helped to regain her position in the silk markets of the world.

All of this is good. But it does not go far enough. Missionaries and schools are comparatively few. The Government is too much occupied in a struggle for existence to extend experiment stations much in the near future. About the only enterprise which is in a position to profit directly from an increase in well-being among the rural population is the railway system.

The most conspicuous examples of railways which have attempted to carry scientific knowledge to the farmers in the territory which they serve, are the Atlantic Coast Line and the Southern Railway, both serving the cotton growing southeastern states of America. This part of the Union was particularly backward agriculturally for several reasons, among which were a large negro population, poverty which succeeded the Civil War, decreasing fertility due to constant cotton cropping, but most important of all, perhaps, dependence upon a single staple. If the one crop failed or the price was low, the farmer was so crippled financially that he was plunged into debt at so high a rate of interest that he was in virtual slavery the rest of his life. For this reason these railways inaugurated a campaign for general farming. This campaign consisted in demonstration trains containing exhibits of improved grains, grasses, vegetables, and other products, designs for buildings, models of dairies, charts comparing results under the old methods with results under the improved methods, and pens of actual animals of the best thoroughbred types. These trains were accompanied by lecturers who explained what was shown, the methods used, and the ends attempted. Fairs were made a part of the propaganda, and contests were arranged with prizes for the best hog, the best ear of corn, the biggest yield of potatoes, the most profitable acre of vegetables and similar desirable objectives. These methods aroused considerable interest, but for a number of years they seemed to make little headway in improving the lot of the southern farmer. In spite of the generally high average of schooling and the reputation of the American for intelligence, the American farmer is essentially a conservative when it comes to methods to be used in the business in which he and his fathers for generations have lived. Like the Chinese farmer, he has lived very close to the margin of existence according to the standards of his community. He has so little and that little is so precious to him, that he is loth to risk any of it in doubtful experiments. He was interested in a seven hundredweight hog and a ton steer just as he was interested in the elephant at the circus. But he had no more idea of raising such hogs and such steers than he had of raising elephants. From the lectures and the exhibits on the demonstration train he might be ever so

convinced that by a certain course of feeding and breeding he himself could produce a seven hundred-weight hog. But his prime concern was not what a man could do for a hog but what a hog could do for a man. And of that the lecturer in a demonstration train was rarely in a position to prove convincingly. He generally had to admit that these monstrous animals had required a course of stuffing with high-priced feeds and personal attention that left no profit unless the animal were sold at a price for show or for stock purposes which was very much in advance of what the farmer very well knew was the value for meat. "White shirt" and "book" farmers often had produced superior animals, but the business success of such "dude" farmers was generally a joke in the neighborhood. Yet these railroads persevered and to-day, when a crisis has arisen, these southern states are able not only to keep up the production of cotton but to feed themselves almost unaided, and thus allow the surplus of the North and of the West to go over the seas and sustain the peoples who are at the forefront of the fight to preserve civilization.

However, it has always seemed to the writer that quicker results would have been obtained if these railways had also gone into business of actual farming at various points, under the same conditions as those under which their patrons farmed, and, by applying the methods which they were trying to introduce, had demonstrated in cash results the superiority of these methods. Excursions to these demonstration farms in a very few years would have so spread the news as to have made them a veritable Mecca for a host of believers. The system of accounts by which some of the proof would have been educed, in itself would have been a valuable part of the educational program.

One of the Chinese Government lines, it is said, is preparing cases to be installed in all its more important stations in which to display the products of the surrounding country. This is a valuable beginning. It is said also that this line is considering the establishment of agricultural fairs and the fitting out of a demonstration train upon the same principles as those governing the American lines which have been mentioned. But the demonstration farm should be a part of the program. The demonstration train should be a messenger of results rather than a reciter of things hoped for but not seen. By all means have the demonstration train. Do not delay it. For, while the farm is being prepared for its mission, the public mind can be prepared to receive its ministry.

It is a matter of history that many years ago in the state of Nebraska, farmers burned a large part of their corn crop for fuel. With the improvement and the extension of transportation facilities it was found, of course, that the corn, which formerly had been burned, could be marketed for a sum which would buy sufficient coal and leave a comfortable margin besides. China can point to similar examples. Bean oil has served to light the farmer's hovel, but wherever the railway has come the proceeds from the sale of the beans will buy a great deal more light in the form of coal oil and leave a margin to be applied to a better standard of living. In this operation, the railroad gets the haul of the beans out, of the kerosene in, and perhaps a short trip by the farmer out of his profits in the transaction.

Something was said above concerning the improvement of dairy cows. But why improve dairy cows when Chinese do not drink milk nor eat butter? Well, that is hardly a fair question. Some Chinese do drink milk and eat butter, and more would do so if prices were not so exorbitant. Foreigners both in and out of China use these commodities and are willing to pay for them. The prosperity of Denmark is said to have had its source in the rise of dairying in that country. It surely did not get rich by eating its own butter. Who knows but that in time China could compete with Denmark for her foreign market in dairy products? But right now China imports over a half million taels of butter, while imports of cheese, condensed milk, and similar dairy articles bring the total up to over a million and a half taels. At prevailing prices in Peking, a catty of good butter will exchange for fourteen catties of rice. This illustrates the advantage which can be obtained by producing a high grade article of commerce even though it might not be consumed at home. No doubt the entire amount now imported would be produced by a number of cows no greater than that now maintained in China if the breed were of an efficient type. Without consuming one blade of forage more,

the rice consumption in China could be increased by the worth of one and a half million taels.

A similar point can be made with respect to canned fruits and jams, of which about one and a half million taels' worth are imported. These products now come from countries where land and labor are much more expensive than in China, and bear in addition the cost of carriage half way round the world. It would be an imagination sluggish indeed which would accept the suggestion that the illustrations just given exhaust the list. Airplanes are using up all the castor oil. Has any one started planting the castor bean in China? When the clothing world was dictating garments of white because the Germans had all the dyes, was there not a chance for the vegetable dyes of China? The well-read farmer, who one morning in early April sees in his daily paper the Government crop report that fifty per cent of winter wheat has failed to survive the sleet storms, can immediately turn his attention to preparing his fields for spring wheat instead of for corn. But the illiterate peasant can do nothing of this sort. Would it not pay the Chinese Government Railways to provide an expert who should follow events such as these so as to put the man power and the acres of the Chinese farms to producing the crops which will bring to them and to the community the largest returns from the markets of the world? This comes under the head of encouragement of specialization, mentioned in the outline above.

During the past few years in the rest of the world we have been admonished to "cut out" the middleman and thus reduce the price of living. We haven't obeyed very much and the cost of living certainly has not declined. But the express companies in America woke up one morning not many years ago and found that the Interstate Commerce Commission had cut their rates almost in half and that during the same long night Congress had provided a most formidable competitor in the shape of a parcels post to be conducted by the post office department. It was a cruel shock. It was really difficult for these express companies to find an excuse for living. One leading company actually did wind up its affairs. But some of the more hardy survivors decided to eke out an existence if possible by assisting in the capital operation on the middleman. A considerable traffic was created by the establishment of a marketing department which registered lists of both consumers and producers, determined the reliability of each, attended to shipments, deliveries, collections, and payments. Perhaps something of this nature could be developed in China. Who knows? Has any one ever looked into the subject?

Perhaps any plan of this nature would have to be accompanied by an adaptation of equipment to the special needs of the commodities to be shipped. Adaptations of this kind surely would be profitable in some respects. For instance, the large, good-flavored oranges in Peking cost six coppers each. The same orange in Ichang, not far from where it grows, costs one copper. Five coppers have been added to the cost of that orange by middlemen, losses from spoiling, and transportation. In California a similar fruit has a value at the initial packing house of about one cent each. By means of the pre-cooling plant, the refrigerator car, and methods of meeting the market, that orange is carried across the continent and sold in Chicago, New York, Quebec, even Halifax, for twenty-five cents a dozen and in rare cases, only, for more than three cents each.

The orange market was studied out something like this. The purchasing power of a people may be represented by a pyramid. Those at the top who can afford to pay a high price are rather few in number. If oranges are fifty cents a dozen they are articles of extreme luxury, indulged in only infrequently except by the wealthy class who comprise perhaps not more than a million individuals. If oranges can be sold for twenty-five cents a dozen they will become an article of diet for all except the very poor. Ninety million people could eat them freely. Better a sale of ninety million dozen at a profit of five cents a dozen than only one million dozen if the profit were as high as twenty cents a dozen. The problem was how to reduce the price to twenty-five cents a dozen and still leave a profit of five cents.

Pre-cooling and the refrigerator car have done much so to minimize decay that practically one hundred per cent of shipments are sales. But the methods of marketing has perhaps even more to do with it. Oranges are loaded before they are sold. They have already been carefully graded. As a rule only one grade

is loaded into a car. If more than one grade is put in, the number of boxes of each kind is recorded on the bill of lading and the waybill. The car is consigned "to order" at some point three or four days away from point of origin in the direction of expected destination. Then a market is sought by telegraph. The number of the grade and the name of the packer or his trademark is guarantee of quality or of responsibility if, in case of accident, the quality should fall below grade. Bids are made by dealers in various cities according to the state of the market. Wherever the bid is highest, be it Topeka, Detroit, Washington, or Montreal, there the car is sent by means of a "diversion order," which the shipper issues to the railroad and which is telegraphed by the railroad to the destination originally named in the waybill. In this way the fruit is moved expeditiously to the market where it is most wanted. Gluts are avoided and famines averted. There is no such thing as dumping good fruit into the river in New York while Philadelphia suffers from want of it. The whole marketable crop is sold.

If in China such arrangements could be made as to reduce the price of the six-copper orange to three coppers, is it not probable that such an increase in consumption would result that even if the Ichang producer received only one copper each, the same as before, his profits would be greater? If so, the railroad would receive all this additional business, also the haul of the additional goods that the Ichang producer could now afford to buy,—and we would all have that many more oranges to eat. By such steps is national progress made.

This brings to the foreground another phase of this subject. If by some means like those enumerated above, the railways of China could build up their traffic in agricultural products, not only would they increase their own profits and contribute to the material well-being of that most numerous and most fundamental class of society, the farmers, but they would be rendering a service highly patriotic to the nation as a whole.

Probably never before was there a time at which the subject of mere food so much occupied the attention of so many people. At the close of the 1917 harvest the store of wheat was said to have been 25 per cent short of normal. The winter just past has been one of the most unfavorable for the fall sowings. Of the principal substitute, maize, forty per cent of the 1917 crop failed to mature. In America meat animals per capita have been declining for several years. It is said that the world supply has decreased 115,000,000 head since 1914. We have heard a great deal about the increased cost of living in various parts of the world. China has not been free from the same experience. Currency questions may be involved somewhat but there are other influences more concrete and more immutable. Coincident with the rise of industry has been a phenomenal growth of cities—a perfect rush from the country.

Simple enough, then, to explain the increase of prices. Production has not increased as fast as consumption. Foreign markets have been forced to get along with a relatively diminishing food surplus. The world is growing smaller. Its grand divisions are moving ever closer together. China is more than ever a part of that world, and the hungry peoples abroad are more than ever demanding that its fertile valleys furnish for their tables. Nor is there any hope that the foreign demand will lessen perceptibly. True, the demand is somewhat abnormal just at present. But the material losses of this war are practically all of them from fields outside of agriculture. Shipping sunk, railroads torn up, cities ravaged, bridges destroyed, arms and motors and munitions used up—all are city products. While the populations of the nations affected are restoring these things to the fabric of society as it existed before the war, they will have to be fed just the same as they have been during the war.

A land that imports rice to the value of twenty million taels per annum naturally does not have much food to spare. But as the demand for foodstuffs grows more insistent in the rest of the world, more and more of the Chinese surplus, which finds its way to ports, will find markets abroad. This will inevitably drive prices ever higher in China. It is a cruel thrust to suggest that China may possibly have troubles yet to taste, but imagine food prices doubling within the next two or three years! The purchasing power of the coolie will certainly not double within that time. What is the answer? The highest civilization is said to be only three meals removed from savagery.

Building of the Taitam Tuk Dam

History of the Engineering Works Which Afford Hongkong an Ample Water Supply

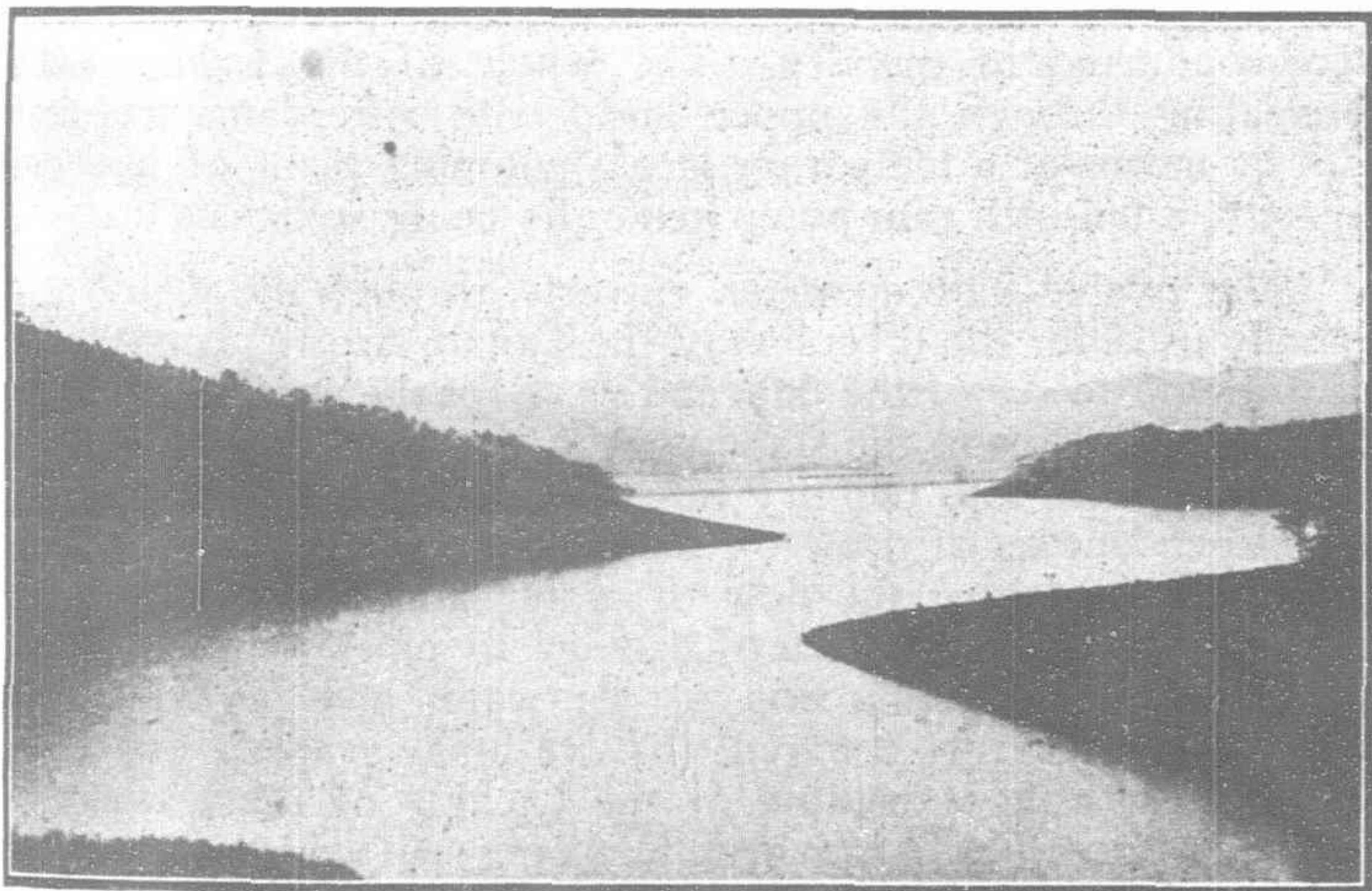
[By D. JAFFÉ, A.M., INST. C.E.]

The first we hear of a regular water supply for the City of Victoria is in 1860, some twenty years after the occupation of the island when the project for obtaining water from Pokfulum was considered. Prior to 1860 water was obtained from wells and from the streams flowing down the northern slopes of the hills immediately above the City. These streams were tapped above the built area and led into small tanks from which the water was supplied to the inhabitants.

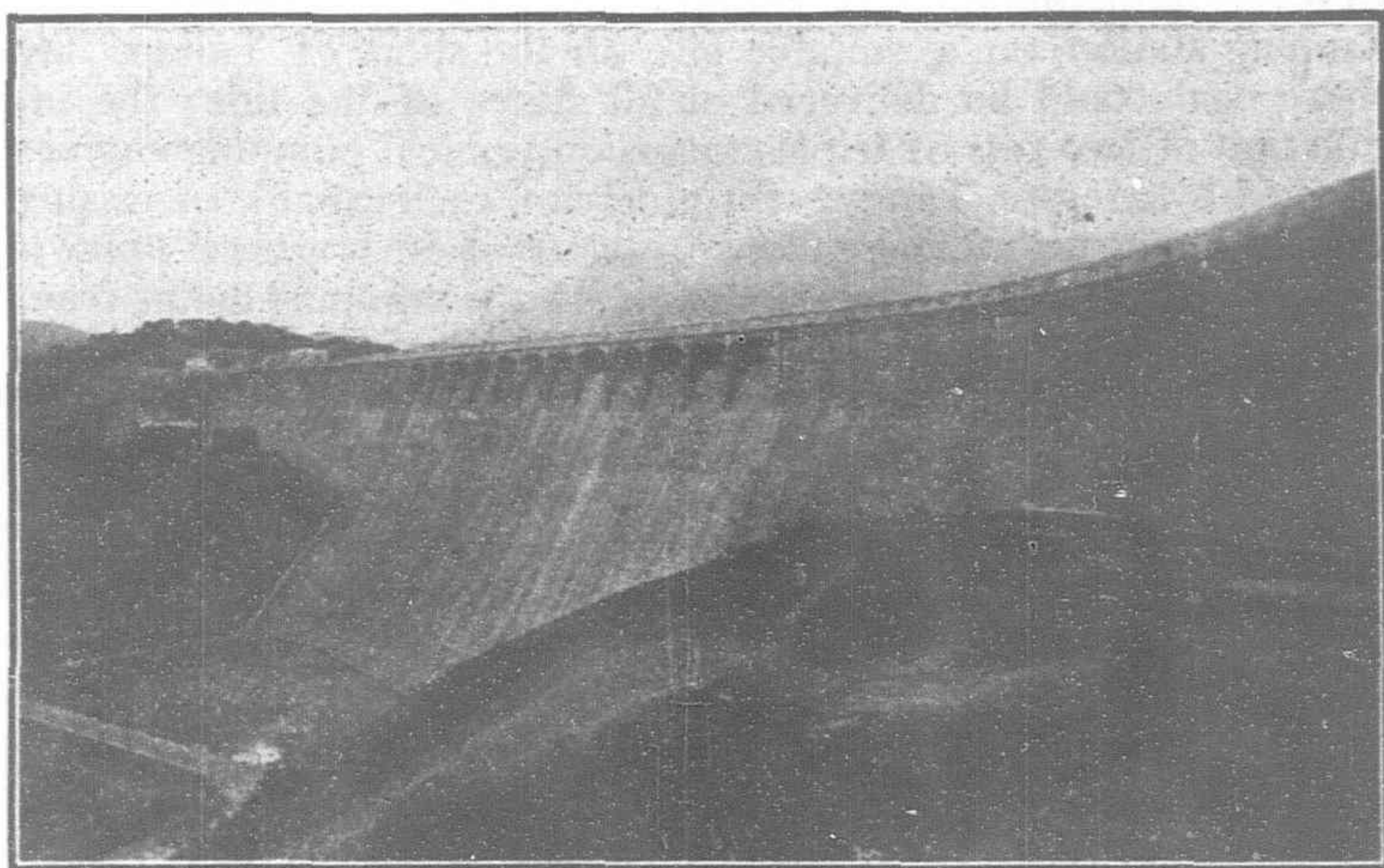
In 1863 the Pokfulum works were completed at a cost of \$170,000; they comprised the construction of a small intake reservoir holding 2,000,000 gallons, a ten-inch cast iron main from Pokfulum to Robinson Road, a tank to hold 200,000 gallons at the termination of the main and another at the top of Taipingshan to hold 850,000 gallons and the erection of thirty fountains and 125 fire cocks. No sooner was this scheme completed than the intake works proved too small, and during the years of 1866 to 1871 the much larger Pokfulum Reservoir, holding 66,000,000 gallons, which is still in use, was constructed. This reservoir cost \$223,000 to construct. Three years later in 1877, the conduit from Pokfulum reservoir to the Albany Tank situated on the east side of the Glenealy ravine, a length of a little over three miles, was constructed at a cost of \$62,000. The old ten-inch main from the

An extensive system of distribution works, comprising the laying of twenty miles of mains from fourteen inches to three inches in diameter, erection of three motor pumping stations, and the construction of three additional service reservoirs, etc., was therefore undertaken. These works were carried out during the years 1890 to 1892 at a cost of \$164,000.

In 1891 the supply to the Peak district was instituted which prior to this had been entirely from a few shallow wells. During the greater part of the year the motor at the Bonham Road Station, erected under the distribution scheme, was intended to supply the Peak, but, to cover such periods as the Pokfulum supply failed to give, the necessary hydraulic power, a Worthington duplex ram steam pump was installed. This plant, together with the rising main from the pumping station to the Peak, six cast-iron tanks, and five and one third miles of distribution mains, cost \$32,600. In 1895 the capacity of Pokfulum reservoir was increased from 66,000,000 to 70,400,000 gallons by the addition of overflow boards to the overflow of the dam, and in 1897 the capacity of Taitam Reservoir was increased from 312,000,000 to 407,000,000 gallons by raising the height of the dam 12 feet, thus bringing the total storage capacity up to 477,400,000 gallons.



TAITAM TUK RESERVOIR



THE COMPLETE DAM

reservoir was then taken up. The very meager supply which the foregoing works rendered available necessitated the consideration of further projects. The matter was referred to Sir Robert Rawlinson, who recommended the Taitam Scheme which provided for the construction of a concrete and masonry dam at Taitam to impound 312,000,000 gallons, a tunnel 2,428 lineal yards in length through the range of hills separating the reservoir from the city, a covered masonry and brickwork conduit 5,163 lineal yards in length from the tunnel outlet to the Albany, six filter beds having a combined area of 3,245 square yards, and a service reservoir extending over the Albany nullah of 5,700,000 gallons capacity. These works, which cost \$1,257,000, were carried out during the years 1883 to 1889 and greatly relieved the situation.

In 1890 four filter beds, having a combined area of 1,310 square yards and a service reservoir of a capacity of 941,000 gallons, were constructed for the Pokfulum Supply at a cost of \$37,000. The total storage capacity was now 378,000,000 gallons and it was evident that the mains existing in the city were quite inadequate to distribute the available supply.

Two catchwaters (Taitam West and Mount Parker), to enable better advantage to be taken of the storage capacity of Taitam Reservoir, were also constructed about this period but no further storage works were undertaken until 1899 when Wong-neicheong Reservoir, with an impound of 33,260,000 gallons, was completed.

Water Famine of 1901

This brought the available storage capacity up to 510,660,000 gallons. About this time Hongkong, which had grown enormously, suffered not infrequent spells of water famine. There are still many in the Colony who recall the great famine of 1901, when, after a long spell of drought, the reservoirs became so empty that the expedient of importing water by boat from the mainland had to be adopted. The police and the troops regulated the long queues of water carriers waiting on the water front, and the scenes of that year, wherever there was a drop of water to be had, will not be readily forgotten. This led to the Waterworks

Consolidation Ordinance, which had for its object the economizing of water, being passed in 1902. There were flaws in this ordinance, and it was repealed in the following year, and other provisions made for the saving of water. The Taitam Bymash Reservoir was added to the colony's waterworks in 1904, and gave an additional storage capacity of 26,301,000 gallons, bringing the total storage up to 536,961,000 gallons. The late Mr. Osbert Chadwick, C.M.G., M. Inst. C.E., who was in the Colony reporting on sanitary matters at the time when the water famine occurred, was asked to recommend a scheme for adding materially to the Colony's water supply. Mr. Chadwick recommended the development of the entire Taitam Valley down to sea level for waterworks purposes. This involved embarking upon a pumping scheme as a supplementary supply to the existing gravitation works.

Low-Level Reservoirs and Pumping Supply

Mr. Chadwick's recommendations were as follows: 1. The construction of a low-level reservoir or reservoirs having singly or jointly a capacity of at least four hundred million gallons. 2. The erection of a pumping station on the shore of Taitam Bay well below the site of any reservoir which might at any future date be constructed. 3. The immediate installation of a set of pumping machinery, capable of raising one and a quarter million gallons in twenty-four hours, to be ultimately increased to three such units. 4. The provision of a fifteen-inch pumping main in the first instance to be supplemented later by a twenty-one inch main. These recommendations were in part given effect to during the years 1904 to 1907 when the first section of the Taitam Tuk Works was undertaken.

This section comprised the erection of a concrete and masonry overflow dam, designated the Intermediate Dam, 90 feet in height (110 feet from lowest part of foundations to crest level) about midway down the valley between Taitam Dam and sea level, impounding 210 million gallons; the erection of a pumping station on a suitable site on the shore of Taitam Bay where coal could be delivered at all states of the tide; the installation of two sets of triple expansion vertical pumping engines supplied by Messrs. Tangye, Birmingham, each capable of raising one and a quarter million gallons in twenty-four hours; the provision of a road for the accommodation of the pumping mains from pumping station to the gauge basin at the inlet of the tunnel which conveys water from Taitam Reservoir to the City; and the laying of an eighteen-inch main from the draw-off tower of the Intermediate Dam to the pumping station and a pumping main of the same size from the station to the gauge basin at the inlet end of the tunnel.

Though these works substantially augmented the supply of the Colony, they did not fully develop the resources of the Taitam Valley, nor were they by any means sufficient to enable full supply to be maintained throughout the year. They were, in fact, but the forerunner of the very much larger works which have now been completed. These works, which are designated "The Taitam Tuk Scheme—Second Section," are as follows:

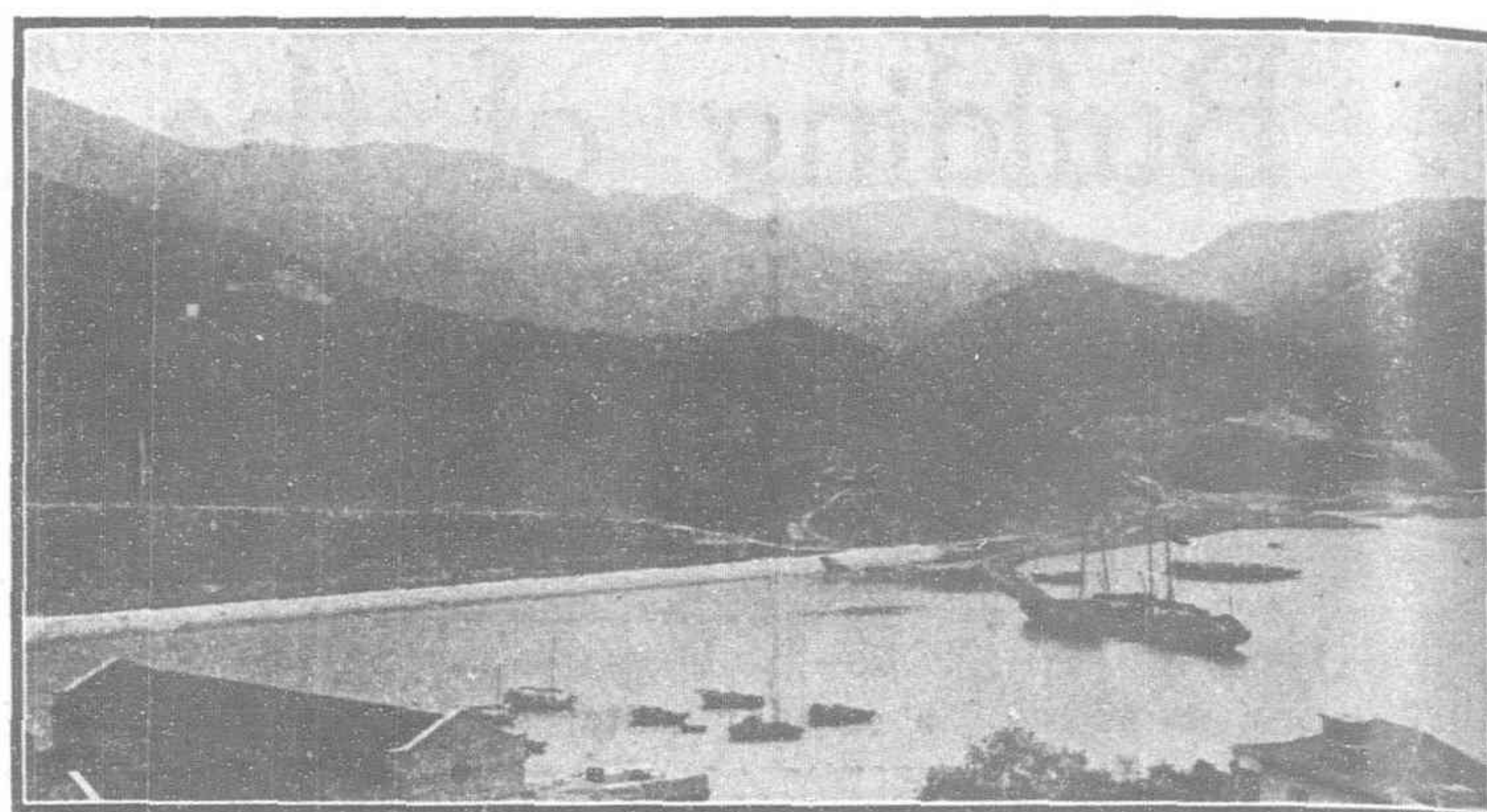
1. A dam at sea level forming an impounding reservoir of 1,420 million gallons capacity designated the Taitam Tuk Reservoir.

2. An extension of the existing pumping station in Taitam Bay and the provision of two further sets of pumping machinery each capable of raising three million gallons per day of twenty-four hours.

3. The laying of two eighteen-inch diameter supply mains from the draw-off tower of the Taitam Tuk Dam to the pumping station and the laying of two additional eighteen-inch pumping mains, making, with the existing one which is the same size, three in all.

4. Road improvements and various minor works.

The dam is 1,200 feet in length (excluding the tongues which extend into the hillside at each end of it) formed of two straight lengths on plan, joined by a short curved length. The overflow from the reservoir takes place over the dam, a length of 279 feet having been constructed of suitable form to admit of this. A roadway 16½ feet clear width, which is sufficient for



TAITAM TUK PUMPING STATION

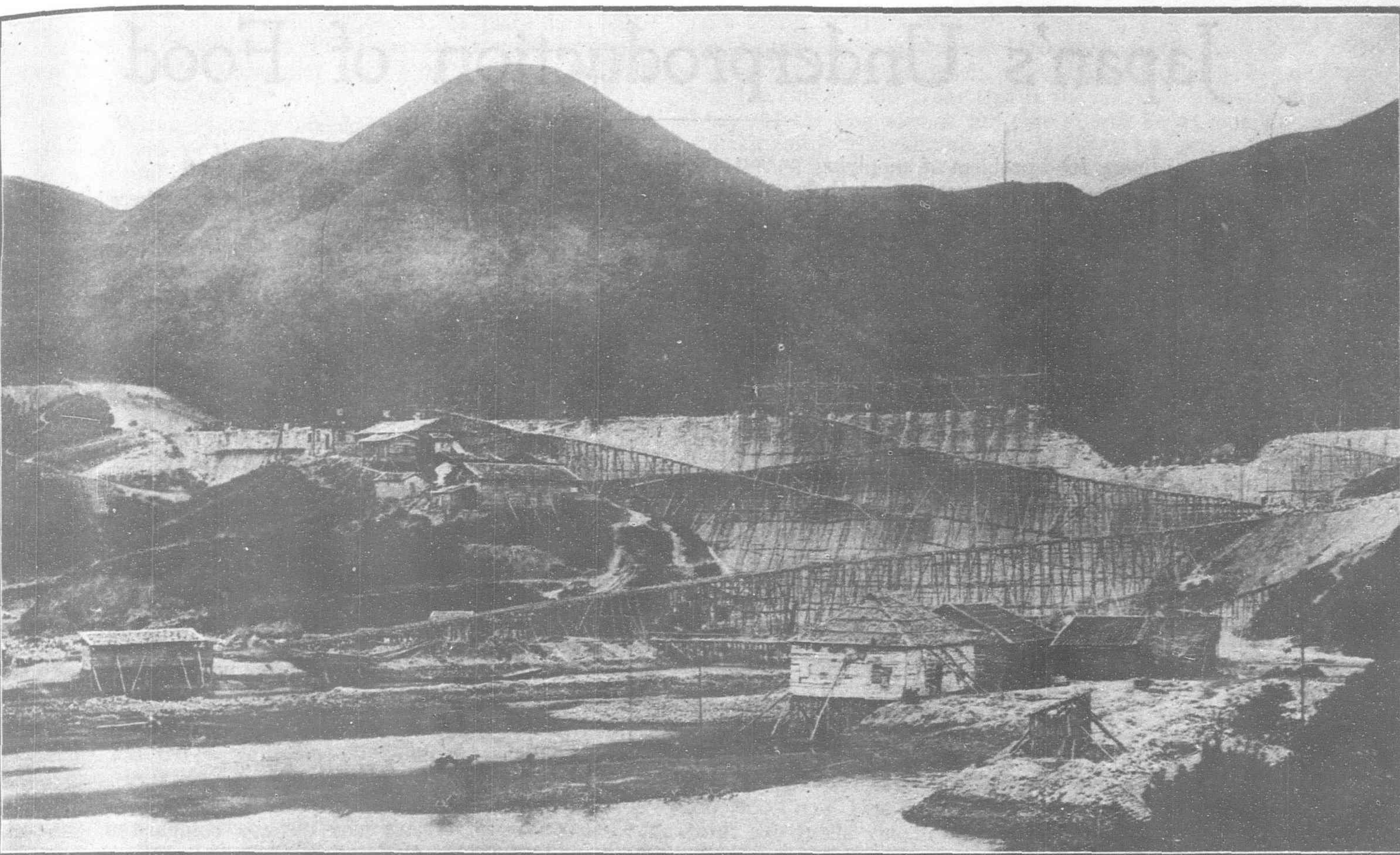
motor traffic, surmounts the dam; the roadway is carried over the overflow cill on 12 arches each of 20 feet span. The maximum height of the dam from the lowest part of the foundations to road level is 171 feet and the maximum width at the base 115 feet. A unique feature of this dam is that for a length of 238 feet the foundations had to be excavated below sea level, the maximum depth below L. W. O. S. T. to which it was necessary to excavate being 41 feet.

In order to enable this part of the work to be carried out, two cofferdams were erected across the bed of the stream, which flows into Taitam Bay, one above and the other below the site of the trench for the dam. The upper cofferdam diverted the stream into a cut leading to two twelve-foot diameter culverts through the base of a section of the foundations of the dam previously completed. The lower cofferdam kept the sea from flooding the trench. These temporary arrangements proved quite satisfactory. The foundations of the dam, between the cofferdams, were carried down to sound rock and subsequent building operations were conducted in the dry. The whole of the leakage water percolating through the upper and lower cofferdams was dealt with by means of a temporary steam pumping plant of moderate capacity, a ten-inch ram pump generally being sufficient.

The twelve-foot diameter culverts through the dam (temporarily used for the diversion of the Taitam stream) connect with the draw-off tower of the dam and serve for the permanent accommodation of mains to the standpipes in the tower. The draw-off tower is divided into two dry valve wells each of which contains an independent set of draw-off pipes complete with internal slime valves for controlling the flow of water and external penstocks for use in the unlikely event of damage to pipes or valves. The dam, from the foundations to top-water level, is constructed entirely of cement concrete of various grades, the whole of which, with the exception of the backing of the masonry of the water face, has large granite stones embedded in it. The backing of the masonry of the water face is of fine cement concrete and is 11 feet thick at the base of the dam and 5 feet thick at top-water level. Above top-water level lime concrete is used for hearting.

The quantities of soft and rock excavation for the foundations of the dam and the amounts of cement concrete and ashlar masonry used in the construction of the dam were as follows:

Soft excavation	..	..	..	..	..	62,980 cu. yds.
Rock	"	"	"	"	"	23,838 "
6 to 1 cement concrete hearting	..	..	..	..	..	31,209 "
7 to 1	"	"	"	"	"	39,900 "
8 to 1	"	"	"	"	"	28,754 "
4½ to 1	"	"	"	"	"	backing to masonry of
water face	..	..	..	..	..	28,805 "
Lime concrete filling from top-water level to road level	..	..	..	..	..	3,338 "
Hand-packed rubble from top-water level to road level	..	..	..	..	..	655 "
Ashlar face masonry	..	..	..	..	..	164,858 cu. feet.
Rubble face masonry	..	..	..	..	..	59,400 "
Ashlar masonry for string courses, carrelling	..	..	..	..	..	83,361 "
courses, parapets, culverts, valve house, etc.	..	..	..	..	..	196,400 bags of 250 lbs.
Cement	..	..	..	..	..



THE DAM DURING CONSTRUCTION

Pumping Station

The two additional sets of pumping machinery, which have been supplied and erected by Messrs. James Simpson & Co., Ltd., London, are of the inverted direct acting type. The engines are triple expansion, the piston rods of the three cylinders being directly connected to simple-acting plunger pumps by means of crossheads and side rods. Each engine has two flywheels, one at each end of the engine, the crank shaft being prolonged for outer bearings beyond both wheels. The high pressure cylinder is 18 inches in diameter, the intermediate cylinder 31 inches, and the low-pressure cylinder 50 inches in diameter. The plungers of the pumps are 15 $\frac{3}{8}$ inches in diameter. The stroke is 36 inches and the revolutions 30 per minute. The normal capacity of each engine is 3 million gallons in 24 hours, but the engines are specified to be capable of running efficiently and economically when running at a slower speed and dealing with 30 per cent less than this quantity. The maximum efficiency is specified when working against a head, inclusive of friction, of 350 feet, and pumping at a rate of not less than 3 million gallons in 24 hours. Three boilers are provided of the Lancashire type each 26 feet in length by 7 feet 6 inches in diameter,—two to be capable of supplying steam to the whole plant when running under all conditions of working, the third boiler to be in reserve. The boilers are specified to be capable of the above duty at 80 per cent of their steaming capacity. The working steam pressure is 150 lbs. per square inch. A Green's economizer, consisting of 96 pipes in two sets of 48 each, is provided, and multitubular superheaters, capable of raising the temperature of the steam 120 to 130 degrees Fahrenheit above the temperature of the steam at 150 lbs. pressure, are fitted in the smoke chamber of each boiler.

The official trials and tests of efficiency and steam consumption have not yet been carried out, as some renewal parts, which are being supplied by Messrs. James Simpson & Co., Ltd., have not arrived in the Colony, but one engine has been in continual use day and night since December 8.

Mains

The pumping and supply mains are cast-iron socket and spigot pipes, 18 inches in diameter, 12 feet in length, and $\frac{7}{8}$ in. in thickness, weighing 19 cwts. each. As previously stated there are three pumping mains and two supply mains, the length of the former from the pumping station to the inlet end of the tunnel through which water gravitates to the city is 3,430 yards and of the latter from the draw-off tower of the Taitam Tuk Dam to the pumping station 900 yards. All three pumping mains are being pumped through, but two are sufficient to convey the present full supply to the city in the event of the third main requiring repairs.

Cost of the Work

The approximate cost of the Taitam Tuk Scheme—Second Section Works is as follows:

Taitam Tuk Dam.. .. .	\$1,828,000
Pumping Station, Extension of Buildings, etc. ..	56,500
Pumping Machinery, erection, and other charges ..	270,000
Pumping and supply mains	246,000
Miscellaneous charges	16,500
	<hr/>
	\$2,417,000

The Taitam Tuk Reservoir was formally opened by His Excellency The Governor of Hongkong, Sir Francis Henry May, K.C.M.G., LL.D., February 2, 1918, when a suitable commemoration stone was set at the termination of one of the parapets of the roadway over the dam.

The Second Section Works have been carried out under contract by the Public Works Department of the Colony, of which Mr. William Chatham, C.M.G.M., Inst. C.E., is the head. Mr. D. Jaffé, A.M., Inst. C.E., was the special engineer responsible for the design and superintendence of the work, and Mr. R. M. Henderson, A.M., Inst. C.E., was chief assistant engineer for the dam.

Japan's Underproduction of Food

Japan has the ordinary food problem of supplying 55,000,000 people whose numbers are steadily increasing and whose standard of living is rising. She has likewise certain food problems arising out of the war, although Japan has been late in having her food prices affected as compared with other countries. Some of the factors which have brought about the rise in 1917 have been the transport difficulty tending to diminish imports on account of high freights, the stoppage of wheat import from America, the control of Rangoon and Saigon rice by the warring nations, and finally the rise in the price of silver making all imports from China more costly. As a precaution against military eventuality, there has no doubt been in the last three years a certain amount of stocking by the authorities. As will be seen later, Japan has also developed a considerable export in foodstuffs.

Present Prices

The present high prices are due to several causes: (a) Diminished Imports. The rice imports for the past ten years averaged Yen 18,000,000 per annum; for the last three years it has been something like Yen 5,000,000, Yen 3,000,000, Yen 6,500,000 respectively. The wheat imports for the past ten years averaged Yen 4,000,000 and for the last three years have been Yen 1,500,000, Yen 1,225,000, Yen 700,000 respectively. The import of beans, peas and other pulses for the past ten years has averaged Yen 10,000,000; and in the last three years have been Yen 9,225,000; Yen 7,000,000; Yen 9,500,000 respectively. Flours and starches for the past ten years have averaged Yen 1,000,000, while the average for the last three years is only about one third of that amount.

(b) Increased Exports. The average export of rice for ten years has been nearly Yen 7,000,000; in the last three years it has been Yen 9,500,000, Yen 11,000,000, Yen 14,500,000 respectively. The export of pulses averaged for ten years seven and one third million; in the last three years, Yen 9,000,000, Yen 17,000,000, Yen 33,500,000 respectively. Flours and starches averaged for ten years nearly Yen 4,000,000 and for the last three years the average has been Yen 13,000,000.

Difficulties

There are certain phases of Japan's problem which deserve close study. The larger proportion of the population is still agricultural. From 25,000,000 to 30,000,000 out of the total 55,000,000 are still on the land. Seventy per cent of the rural population have less than one hectare ($2\frac{1}{2}$ acres) of land; ninety per cent have less than two hectares (5 acres). This surplus of rural population makes for intensive cultivation in a style which is economical of every thing but human labor. Nothing exceptional has been done in Japan in the way of dealing with this surplus population, except in so far as rural depopulation always arises as a consequence everywhere with the development of industry and commerce. The exodus from the rural areas has gone up in the last three years, accelerated by the more rapid development of industries which have been stimulated by the war.

Even suppose the surplus rural population of Japan were removed from the land faster than they could be absorbed into the industrial spheres, the possibilities of emigration are nil compared with the possibilities in days gone by to English and Scotch forcibly displaced at various stages in the agricultural and industrial evolution in Britain.

Small holdings, proprietary or leased, make the accumulation of capital depend on coöperation and on rural banks. Both of these are still in their infancy in Japan. A landed gentry living on and taking close detailed interest in their estates is practically unknown in Japan and to the credit of such a class must be placed many agricultural improvements and advances in Britain—a result of the centering of capital in the hands of landowners with a pride in their ancestral acres.

Geological Difficulties

Japan is a land of steepness and flatness. There is no rolling or gently sloping land. The upper course of a Japan river is torrential, while the lower portion is sluggish with the river bed a little below the surrounding country. As a result, at present about sixteen per cent of the land surface is cultivated. The slopes have their margin of cultivation determined by prices of products. Any one traveling regularly over a period of years can see the margin of cultivation going slowly higher and higher on the slopes. Tea, fruit, and mulberry are better adapted to the slopes than are ordinary crops.

Little Animal Husbandry

Japan has not taken up the animal industry to any great extent. Milk, butter, cheese, and flesh of animals are not the important items in the diet of the people. The nitrogenous element in Japan food is derived from fish flesh and leguminous seeds. It is particularly difficult to arrive at a correct figure for the total amount of fish consumption in Japan, and in any case in an article dealing with agricultural questions a discussion of fish matters is out of place. Flesh meat, be it animal or fish, is not regarded as the staff of life in the same way as grains, vegetables, and other food crops are, and this is particularly true of Japan.

Arable Area

The total area of the country in Japan proper is about 100,000,000 acres. If we may make a comparison, Japan has about one half the population living on one twentieth of the land surface of the United States. In round numbers, only about 6,000,000 hectares (15,000,000 acres) of the land surface are cultivated; one half of this is irrigated. Of the irrigated land, sixty per cent produces one crop; thirty per cent, two crops; ten per cent, one food crop and a green manure crop. Of the non-irrigated land, most produce only one crop, but a percentage produces two crops. It is estimated that the products of 8,000,000 hectares (20,000,000 acres) are available annually.

From this total area of arable ground in Japan there falls to be subtracted the space occupied by non-food crops, such as mulberry, indigo, tobacco, cotton, hemp, rush, rapeseed, flax, peppermint, etc. Fruits are not, strictly speaking, absolutely necessary foods and the area occupied by oranges, persimmons, pears, peaches, apples, etc., is considerable. The land covered by tea has not varied much for several years and is about 50,000 hectares. The area covered by mulberry is nearly ten times as much.

Profitable Deal in Fertilizers

For the past ten or twelve years there has been a steady increase in the application of modern fertilizers to the various crops, and in 1917 Japan paid her fertilizer import bill of Yen 78,000,000 by an export of foodstuffs to the same amount. This increased export is, as has been already pointed out, one of the several factors causing increased food prices, but the rise can not be considered excessive in comparison with what has taken place in other countries.

Japan's Staff of Life

Rice, pulses, barley, naked barley, millet, and sweet potato are the great stand-bys. Rice is produced annually to the amount of 250,000,000 to close on 300,000,000 bushels. There never is a surplus of rice. Low prices mean an increase in the number of people who are eating rice as a portion of their daily food. High prices mean a reduction in the number of rice consumers. The rice line is a kind of class division. Barley and similar cereals are produced to something less than one half of the total of rice. Of millet, about 17,000,000 bushels represent an ordinary crop. Of sweet potato, about 4,000,000 tons are grown annually. Millet and sweet potato are the principal items of

food for rural and other districts whose means place them below the rice line. The barley group of cereals is more important because the military authorities work with a diet of six parts rice to four parts cereals.

Pulses. About 25,000,000 bushels of various beans and peas are produced, and for the past ten years there has been an annual import of ten and one half million yen's worth. From these two sources there is always a surplus. There is an export of green peas, and much bean cake is applied to the land as fertilizer. Neither wheat, buckwheat, nor maize can be described as of primary importance in the Japanese food schedule. They are mostly used as supplementary or occasional rather than regular items of diet. The ordinary potato is extensively grown in Japan, the annual output being about 800,000 tons. There has been for a long time a regular export of tubers to Manila and other places. Lately the foreign house wives in Japan have been astonished by the rise in the price of ordinary potatoes caused by the development of an export to Europe of farina or potato starch.

Korea and Formosa

Korean rice production is about 60,000,000 bushels from 3,000,000 hectares. The yield works out about one half the average yield of Japan. The greatest difficulty in Korea is irrigation. Even suppose the rice output were doubled, that would not do any more than allow the Korean consumption of rice to begin to approach the same scale as in Japan. Import of rice from Korea to Japan can continue only so long as the Koreans (estimated population around 20,000,000) are content to live on less expensive cereals. Formosa produces about 22,500,000 or 25,000,000 bushels of rice for a total population of 4,000,000. Here again there is little or no surplus unless the people of the country are content with inferior grains.

World Rice Problem

Japan, China, and Eastern countries, as well as all others where rice is the main cereal, face the fact that the rice-consuming population—by increase and by rise in scale of living—is treading closer on rice production than the wheat-consuming population is on wheat production. On account of limited area, Japan can never be wholly self-supplying with home-grown rice but must import. No doubt there will be modifications in diet as years go on, but so long as the rice line is the dividing line of respectability Japan has and will have a food problem. No one familiar with Japan can fail to realize that the food question occupies the most serious attention of every responsible man. Few conversations, talks, or lectures on general economics are free from the food question, and indeed the general political policy of the country hangs largely on the pressure of the population on the food production.

such things as are now commonplace; and they will realize the lesson taught by such places as Hongkong and they will set to work to improve local conditions. It is always dangerous to prophesy, but it is almost safe to say that in the not very distant future the house of the engineer in the tropics will be as suitable for the climate and local conditions as a Montreal high-class hotel in the winter. For just as in the Montreal hotel the building has been constructed and arranged so that the temperature within it is very much higher than the air outside, and the guests have all the advantages of electric light and hot and cold water, so will the ideal house in the tropics be arranged to make happier and more efficient in his work the man who must live in the trying climate of the places near the equator.

Let us try to imagine the ideal house built according to the desires of the scientific and energetic engineer. In the first place it will be constructed entirely of reinforced concrete and that will do away with all the difficulties of white ants and other insects. The reader will be surprised to read that there will probably be no verandas, unless one is placed on the north side of the building so that full advantage may be taken of any particularly enticing day. But generally the verandas will be absent and all the windows will be closed or even hermetically sealed. Air will be drawn into the house and will first of all be relieved of its moisture and it will then be cooled. It will be kept in circulation and the temperature will be nicely adjusted according to the taste of those in authority. Every house will have its own fans, electric light, and cooling plant. Machinery will do all of this; and it will also play its part in the water supply of the establishment. Of course where people dwell together cold will be supplied in pipes, just as water will be, and just as electricity is supplied by means of cables. Concentration pays in the production of cold as well as in the production of electricity, and what people of the new generation will marvel at most is that we and our predecessors were content to purchase cold in the shape of clumsy blocks of ice instead of having a cold system laid on to our houses.

It would be easy to continue to develop this idea and it will be returned to again in the future. But just at present the one object of the writer is to convince every reader of this journal that it is his duty to act as a missionary for engineering trade in the Far East. It is only by the development of applied science that China can possibly be relieved of the tragedy of the floods and the pinchbeck rebellions. Europe went through that stage of chaos once and although the Germans have prostituted scientific knowledge to render themselves more barbarous than any other people in history, yet we have the shining example of the Anglo-Saxon race using this knowledge not only to develop the jungles and marshes of the tropics but also to carry knowledge of all that is best in life into the dark corners of the earth. Just at present the Anglo-Saxon race is using the fruits of its researches in order to save the whole world from enslavement and when that is accomplished it will turn with renewed energy and increased inspiration to carry on its great mission of developing the natural resources of the whole world.

The Future of the Tropical House

[BY OUR SOUTH CHINA ENGINEERING CORRESPONDENT]

In the development of the natural resources of the tropics engineers will play a most important part and the result will make itself manifest in other ways besides the accumulations of wealth. Let us assume, as we have every reason to assume, that British, American, and French engineers will be found scattered over these regions in residence, supervising railway buildings and mines and electrical power schemes. Will these men be content, whatever their income may be, with the usual squalid surroundings of life in the tropics? They most certainly will refuse to put up

Corrections

In the April issue of the FAR EASTERN REVIEW the leading article, The Story of the Chinese Labor Corps, was signed B. Manico Gull. The article was by Mr. E. Manico Gull, there being a typographical error in the initial.

Owing to a printer's error the Volume Number of the May issue was given as XV. This should have been XIV.

Power Production in South China

[BY OUR SOUTH CHINA ENGINEERING CORRESPONDENT]

It is very noticeable that the Chinese are taking more and more kindly to the idea of financing electric light schemes in the provinces of Kwangtung and Kwangsi. There are two influences at work which lead them to consider the subject: electric light is becoming more popular each year, and the idea of electric light is penetrating more and more into those districts remote from the treaty ports. Then, again, all over the Far East, in the Straits Settlements and in Borneo and in the Dutch East Indies, the Chinese are realizing from the results of their enterprise, that machinery does pay. And there is no argument like a good profit to appeal to most of us.

In Canton, gas and oil engines of quite a large size are being made. During a recent visit to Amoy the writer saw a gas engine and producer, manufactured in Canton, of more than 100 B.H.P. In a local rice mill in Hongkong he has seen a four cylinder crude oil Semi-Diesel engine, made by Chinese. It may be true that it is an exact copy of an engine made in Europe or America. It may also be true that there are faults in the design. But there can be no doubt about the fact that the engine runs and has run for several months. And the average selling price of such engines made in South China is one hundred dollars (Mexican) per brake horse power, at the place of production.

Personally speaking, the writer is of the opinion that these locally made engines are unreliable and some day there will be a bad smash-up in consequence. If the smash-up occurs in Hongkong there will be also an inquiry and very likely some one will be censured. But all that is about the future. The one point which the general public should realize is that these engines reveal great mechanical ability on the part of the Chinese. They make them and run them without any foreign supervision. The methods of "design" are crude and the materials used are probably not at all good, but they result in an engine which works.

That leads us to a consideration of another most important factor. The engines are purchased, so far as the cases brought to the knowledge of the writer are concerned, without any reference to fuel consumption. It is quite true that the maker says that they will consume so many "gallons of oil each hour" but there are no official, or other kind of tests. All of the engines inspected by the writer do the work for which they are intended, but as, in some cases, that is driving shafting, it is difficult to say, with any accuracy, what that work is. When the engines drive electrical generators there is some better indication of what the output of the whole plant really is, but even in such a case there is no certainty about the accuracy of the electrical instruments.

Commercial Tests

We find ourselves, in our engineering work in South China, always coming back to the same aspect of the big problem. What is taking place out here which differentiates engineering so much from the same trade or profession in Great Britain or America, is the entire lack of commercial tests. In a power plant in a modern works they are continuously recording consumptions and indicating the engines. "Tuning-up" is a most important part of the engineer's work. In London there is at least one professional engineer who spends all of his time in visiting, as an expert, gas engines of just about the size of those most commonly found in China. He makes proper tests and he usually discovers that the mechanic in charge of the plant has not made certain necessary adjustments to the engine.

The practice against which a protest, and a vigorous protest, is now made is best illustrated by the following example: A man in Hongkong saw that some of his friends were making money by putting in rice-milling machinery. He was a Chinese gentleman who had accumulated some capital. He bought a godown and some machinery, and he had to put in some kind of an engine to drive the mills. He got into touch, through a local compradore, with the makers of oil engines in Can-

ton. Then the engine maker from Canton said that the mill owner wanted an engine of 80 horse power and he mentioned that the price of such engines was one hundred (Hongkong) dollars for each horse power. In short, it would cost my friend \$8,000 for a suitable engine. The oil consumption, for oil used as fuel, would be about 400 lbs. weight (it was given in other units; this is translated) during ten hours of working.

Now it is always dangerous to be dogmatic in engineering work, because improvements are being made so rapidly. When first the Diesel oil engine was put on to the market a good many of us doubted the claims for fuel consumption which were subsequently established. But it did not seem probable that an oil engine built in Canton could have such a good fuel consumption as one half a pound of crude oil per brake horse power hour. Moreover the writer had seen the main shaft for the rice mill, and, unless that were made of very remarkable material, it would most certainly not transmit, for very long, as much as even sixty horse power. Therefore he felt safe in suggesting a fuel consumption test on the engine at the maker's works. That test should always be made on behalf of the purchaser, and it invariably is made in Great Britain. It would have cost, for consulting engineer's fees, etc., less than \$700. It is probable that my Chinese friend did not quite trust me as an altogether disinterested party as it was fairly obvious that I was willing to make the test. Some such idea came to me and I therefore suggested that a local engineer, in whose integrity I have great confidence, should do the work. There was more hesitation, more discussion in the Chinese language of which, unfortunately, I know but a little.

In the end my friend purchased the engine for \$8,000 after telling me that he would think over my proposals. He hoped that I would inform him of what would be a suitable fee for my services. But, as I explained, my services were worth nothing to him, for I had only given a little advice which he had not acted on. I was not a bit offended, but I thought that he had not been very wise in buying that engine at \$100 per horse power without (a) being quite sure that his mill needed eighty horse power and (b) being quite sure that an eighty horse power engine would use the 40 lbs. of oil per hour mentioned. As a matter of fact I subsequently saw the engine at work and it was quite easy to see that it was not running on full load. But as there were no arrangements for making tests it was not possible to find out definitely what was happening. My own impression was that the engine would develop, at the most, seventy brake horse power, and that it was only doing about fifty brake horse power when all of the rice milling plant was at work. In other words, my friend had paid about \$3,000 too much for the engine.

That is the great trouble in South China; it simply amounts to sheer ignorance of modern methods of testing. It is the same in the matter of steel, of which a great deal is bought without any independent tests. Nobody checks electrical instruments, and yet in the torrid climate of South China, these instruments are much more likely to be inaccurate than in other and drier climates.

Despite all of these difficulties the fact remains that the demand for machinery is increasing. There is a difficulty in obtaining delivery, but plants are being supplied from abroad, mostly from the United States. Every engine and each piece of electrical apparatus that comes into the country acts as an advertisement. The things that appeal just now are the appliances that can be used in commercial enterprises. But, in a little time, owing to the spread of education and the assimilation of new ideas, public services, such as water supply and sanitation, will be demanded, and then there will be a great opportunity to show what the application of scientific principles can do to render more healthy the daily life of a people.

The Matshed Catastrophe in Hongkong

The Engineering Aspects of the Disaster

[BY PROFESSOR MIDDLETON SMITH, M.Sc.]

When any structure fails, and especially if the failure has been the cause of loss of life, an investigation into the whole of the circumstances bearing upon the failure should be held. The purposes of such an investigation are twofold. There is, first of all, the purpose of discovering whether any individual was guilty of conduct that could be called criminal or careless; or if any one either did something which he ought not to have done, or left undone something which he should have done. The punishment to be meted out as a result of the inquiry is probably a matter for some other authority; a real purpose of the inquiry is to see whether any one has failed to do his duty. The second purpose is to gain knowledge from the failure. It is said that success is made possible only by the lessons learned from failures; and certainly a great deal is to be gained by studying the causes of breakdowns. For it is a fact, which engineers cannot disregard, that any machine or structure is liable to fail. It is impossible to say of anything built by man that under no circumstances will it break down. It is, perhaps, safer to place reliance on material or machines which have been tested or well designed than to depend upon human nature, which very often fails. But we must recognize the fundamental fact that such failures are not only possible but even probable.

Our scientific knowledge does not guarantee us against failure; it only enables us to reduce a probability. The most experienced and respected designer of bridges was responsible for the construction of the Quebec Bridge, and he frankly admitted at the inquiry held after that disaster that he had made a mistake. When the Charing Cross railway station roof collapsed, all sorts of rumors and suggestions were immediately current concerning the cause of the loss of life which was due to the collapse. It subsequently transpired that the cause of the failure was a piece of bad work which had been done many years previously. Two pieces of the material of which the roof had been constructed had been welded together, but the weld was not a good one. It held for many years; it stood the test of quite a long time; but finally it gave way.

These two cases are mentioned to illustrate the two most common causes of failure; namely, the mistakes of individuals and the weakness of the materials used.

Sometimes, however, an altogether unexpected force comes on the machine or the structure. A large number of buildings were destroyed during the San Francisco earthquake; it is improbable that any one considered the matter of earthquakes when the buildings were designed. It was, however, demonstrated that the only type of construction that satisfactorily withstood the shock, when it came, was reinforced concrete. We can be quite sure

that, as a consequence, reinforced concrete is now popular in districts known to be liable to earthquake shocks. The Japanese had, as a result of an experience of earthquakes extending over centuries, adopted their mode of construction of buildings so that they might be suitable to the unpleasant phenomena of earthquakes.

Another unexpected force which caused the failure of a structure was that which came on to the hull of the vessel H. M. S. Cobra. This ship was designed for a high speed, and it was propelled by steam turbines. It practically broke in two, or as it was generally said at the time, "the back of the vessel was broken." There were many new elements in the design of this ship and an expected force came on to the structure. In this case it might be argued that the designers should have foreseen the force which destroyed it; but that is a harsh argument. The men employed in the work had been careful; there was no question of a miscalculation or willfully running more than the risks usual in such structures. The material was good; at any rate, the general verdict in the minds of engineers who closely followed the inquiry was "misadventure."

The earlier aeroplanes sometimes failed because unexpected forces struck them. Our knowledge of the atmospheric currents and the peculiar behavior of wind was less in those days than it is now.

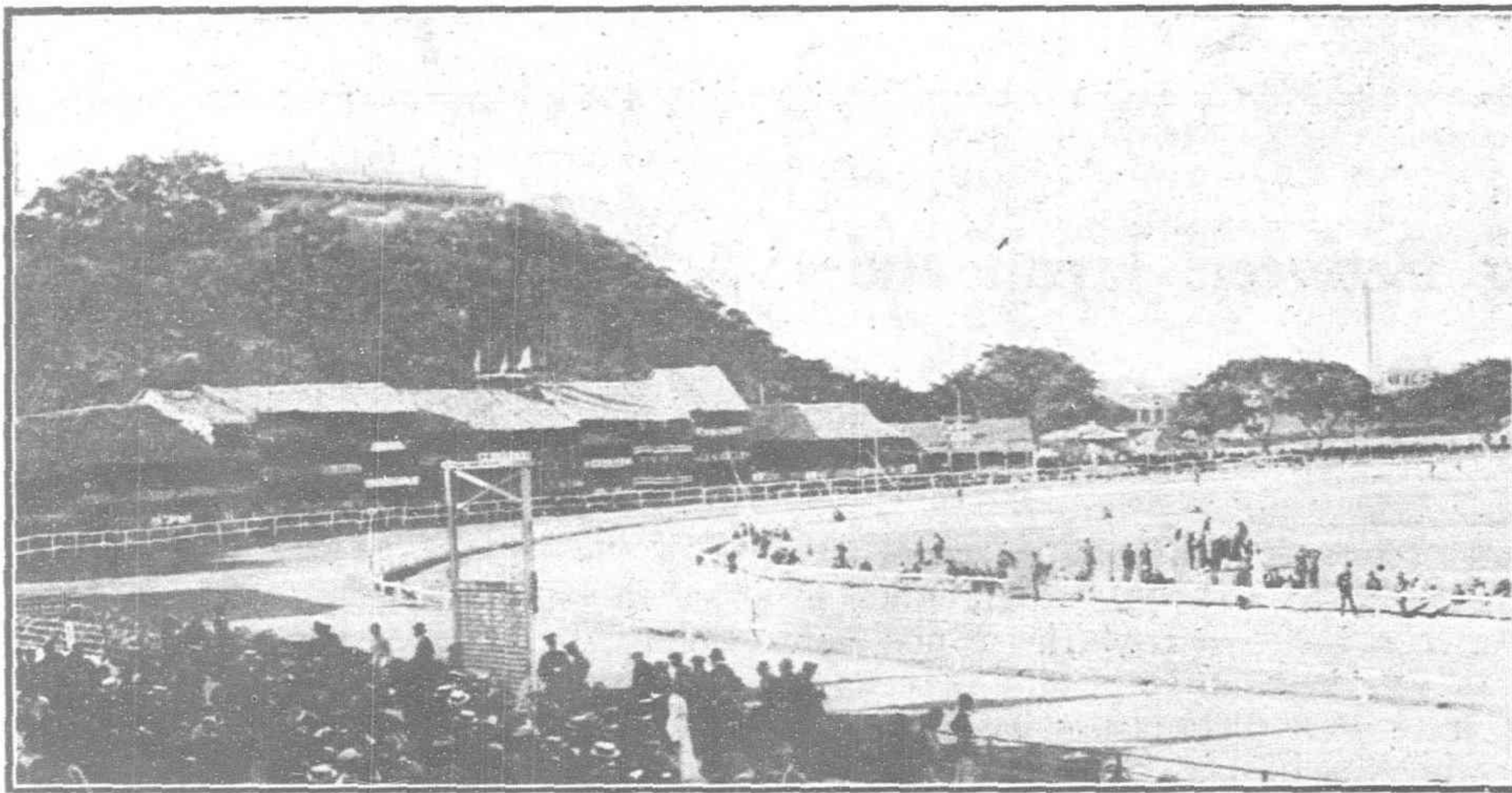
One of the most curious failures, which fortunately involved no loss of life, was in connection with the largest ship of her day, the Great Eastern. It seems almost impossible that a man should design a ship and not foresee that she could not be launched. Yet Brunel, one of the greatest engineers in the

history of the profession, designed the Great Eastern and when the day came to launch her it was found impossible to do it. Subsequently Tangye produced the hydraulic jack, which overcame the difficulty; still, the fact remains that Brunel did not see what seems to us now to have been the obvious.

The Chinese Matsheds

It is only fair to keep in mind these things when we attempt to form conclusions about the failure of the matsheds at the Happy Valley catastrophe of February last. And there is another aspect of the matter that must also be considered. We must not allow the natural grief of, and our sympathy with, sorrowing relatives to bias us concerning what can be expected of the average individual. There is a very great difference between foreseeing an event and actual negligence.

Certain facts regarding the catastrophe are well known. Others will always remain obscure, for the only really convincing evidence was burned.



A VIEW OF THE MATSHED GRANDSTANDS AT HAPPY VALLEY RACE COURSE, HONGKONG, TAKEN BEFORE THE COLLAPSE AND FIRE IN FEBRUARY, WHICH CAUSED A HEAVY LOSS OF LIFE

How long these matshed structures have been built in China is difficult to discover, but nobody doubts that, so far as experience of them goes, the Chinese have had more than Europeans. The familiar matshed theater is certainly to be seen in all parts of South China. Probably everywhere near places where the bamboo grows a type of matshed is used.

The bamboo itself is a most remarkable plant and its uses are many. It should be the natural emblem of China, just as the leek is for Wales or the thistle for Scotland. It is used for food, for carrying water (i.e., as piping), and for many other purposes. It has been said that in some part of the great wall of China the structure is carried on a sort of bamboo raft over marshy ground.

As far as it is possible to discover there is no record of any data concerning the physical properties of bamboo. That is a very remarkable fact, which is one more reminder of how dangerous are some of the ways of the Far East. This material, with the usual lashings and a few poles of China fir, was used in the ill-fated matsheds. There never was any attempt to design the structures in the manner in which other buildings are designed. No plans were prepared. There were no stress diagrams or calculations of stresses or wind pressures. The whole thing was just a matter of experience. The man who built the matsheds had done that class of work for many years. He had great confidence in his own methods and every one else also had confidence in his skill.

The Dangers of "Olo Custom"

Of course matsheds have failed in the past. They have been known to disappear in a typhoon. They have often caught fire and they are terribly inflammable. It was not the fact that the matsheds collapsed that was remarkable, because any structure

may collapse. It was not surprising that they caught fire and burned like tinder. A stray match, even a cigarette end, would set them ablaze, and once the fire started it would be very difficult indeed to put it out. The fire, and even the consequences of the fire, was not surprising. The really astonishing thing is that nobody knows anything about the physical properties of bamboo, one of the materials most commonly used in the Far East.

Investigations upon this important subject are now being made. The work is of a very routine order. There is nothing very original about it. Suggestions will be welcomed by the writer if they will in any way assist in the collection of scientific data. The only thing to do is to use the same general principles that have been used in connection with the tests of other materials of construction.

There is one other point which should be emphasized. There is being used in China a good deal of very inferior material and until there is some definite system of testing that is likely to continue. Samples of all materials used in structures or machines should be tested. It is most fallacious to imagine that all steel, or cement, is of the same strength.

The proper authority to assist upon certain definite standards and regulations in the Far East is the Central Government of China. The provincial governments could do a great deal. Until these authorities thoroughly investigate the whole matter and appoint experts to draw up regulations the only thing left is for Europeans to urge upon the communities the necessity of definite tests. In Hongkong and the International Settlements there should be very definite regulations about such tests.

The matshed catastrophe was one of the most terrible incidents in the history of the Colony of Hongkong. But it may make both Europeans and Chinese realize the dangers of neglecting scientific knowledge.

Closer Working Between Japan and China Railways

The sixth China-Japan Through Traffic Conference recently held at Tokyo closed with a little more done to facilitate through traffic between the two countries concerned. The first of these conferences was held in 1913, and they have been continued every year since. Past conferences have effected arrangements for the through booking of passengers, baggage, and parcels, and the mercantile and traveling public have appreciated the benefits thus conferred. The arrangements for circular tours have been particularly advantageous to tourists, and when normal conditions return will be the means of developing a large tourist traffic over the whole railway and steamer system involved.

The conference just concluded has been able to introduce a parcel delivery service which will do much to promote business between the two countries. Merchants in either China or Japan will henceforth be able to dispatch parcels weighing up to sixty-six pounds to customers in the chief cities on the main lines in either country on a cash on delivery basis.

The conference also arranged that baggage belonging to passengers traveling overland between Fusan and China points, or *vice versa*, which may arrive at Antung either before or after the owners can be dealt with by the Customs' officers and passed on instead of being held, as heretofore, pending the personal attendance of the owners. This will be of great advantage to travelers whose baggage has been booked ahead of them or has followed after them. Another point of importance to travelers was discussed and will soon be settled, to wit, the through booking of passengers and baggage from America. Various steamship lines interested in the Pacific service were represented

at the conference when this subject was discussed, and after their reports have been received by headquarters it is possible that arrangements decided upon will go into effect.

For the past five years the Japanese Imperial Railways have cleared all accounts in connection with the through booking arrangements but this work will now be taken over by the Chinese Government Railways.

In commenting upon the work of the Conferences, Mr. J. E. Foley, the chief representative of the Chinese Government Railways, said that they had proved absolutely necessary in the interests of the mercantile and traveling public, and for the betterment of relations between China and Japan. "Before these conferences took place," said Mr. Foley, "we were sealed books to each other; we knew nothing and cared less. Now we put all our ideas on the table and strive to see where improvements can be made. In this connection we have arranged that telegrams on railway business may be dispatched over the various railway telegraph lines, which will materially facilitate all work of an important and urgent nature. This conference has been productive of good just as the others that have gone before, and it is certain that future meetings will still further benefit the travelers and merchants who use the railways concerned."

The next conference will be held at Peking in 1919, and at Seoul, Dairen, and Tokyo in the years following.

At the conference just concluded the Chairman was Mr. Y. Kinoshita, the Director of the Traffic Department of the Imperial Japanese Railways, who has been one of the foremost workers for the development of traffic between Japan and China, and *vice versa*. The Chinese Government Railways were represented by Mr. J. E. Foley and Messrs. K. Y. Wei and K. H. Chen; the South Manchuria Railway Company by Messrs. Y. Kubo, T. Mino, and T. Okamoto; and the Imperial Japanese Railways by Messrs. Z. Nakamura, Y. Kinoshita, D. Shono, J. Aoki, and I. Okada.

Rural Credit in the East

How it has worked in the Philippines and how it might work in China

Under normal conditions the average Chinese farmer, and the small merchant who corresponds to the farmer in the economic scale, live very much the same simple, frugal, hard, and monotonous lives and the same wholesome and self-sufficing lives that the people of corresponding classes do in any other parts of the world. No great wealth is acquired, there are no luxuries, but there is no great discomfort or suffering. This is true under normal conditions, but during the past few years in China conditions have been so seldom normal anywhere, and troubles which rest heavily upon the farmer and the small trader have been so generally distributed and have succeeded each other with such persistence that famine, flood, pestilence, and depredations by bandits and soldiery have kept the country in a constant state of misery and unrest. Under these conditions there is certainly no monotony in the life of the Chinese common people, and very little peace or comfort, for in the best seasons the farmer's and the small trader's comfort borders just on the edge of want and discomfort, and it takes very little to thrust a great proportion of the Chinese people from tolerable sufficiency into intolerable want.

When, from one cause or another, a Chinese community collapses and transforms itself from a hive of well fed and industrious working people into a community of starving paupers, it seems to recover and set up in business again with remarkable ease and in a remarkably short time. So it seems to the outsider, but a study of the actual rejuvenation of a shattered Chinese community will reveal the fact that it survives by decimating itself, by huge sacrifices, and by radical and most uncomfortable revolutions. Land is mortgaged and lost, children are sold, family ties are broken, the independent become servants, usurers become masters, and while a certain number of individuals survive and take up the thread of their lives again, the community as such is dead. Now against such calamities as this the Chinese people have no insurance and no provision except the mutual dependencies and charitable obligations that exist within families and clans. Outside the family there are only two resorts: charity, a lean wet nurse in a lean land, and the usurer. As life becomes more complex, as communications improve, and villages and towns draw closer together, the ties and responsibilities of the patriarchal clan become less binding, and every catastrophe that sweeps over the land does a little more to scatter families and break up communal organizations. The aggravation of these conditions which forces itself upon the attention of foreign residents in China, as the misery of the recent floods in the north and the sufferings of the country folk in the province of Hunan have forced themselves upon the foreigner's attention, prompts every one interested in the Chinese people, whom the world agrees in promising a great future, to consider some means of forestalling future calamities, some way of arming the long-suffering communities of Chinese common people against the complete economic collapse and ruin which come upon them after every flood, war, drought, or disease that passes over them. Some sort of communal organization that will systematically provide against bad crops and the results of bad government by providing a recovery fund and making it available to the industrious but destitute victims, seems essential if great sections of China are not to be continually laid waste and disorganized.

For such a provision against nature and bad government the Chinese people cannot look to their government. Their failure to find either help or protection in officialdom has driven the Chinese of the cities into an elaborate organization of guilds and mutual help societies which has made them fairly independent of both good and bad government in their individual troubles and calamities, but in the smaller communities all faith was put in the traditions of the patriarchal unit and where these traditions do not stand the strain there is nothing ahead but ruin and reorganization for the survivors.

The rural credit system, the cooperative system adopted by so many thousands of rural communities throughout the world for promoting the interests of countrymen in normal seasons, for adding to their prosperity and independence, might well be adapted to Chinese needs in some form for the purpose of first preserving and guaranteeing the prosperity and independence of Chinese communities and of then increasing their well-being. The possibility of adapting the rural credit system to China has been treated by Philip W. Chen of Columbia University in the following article, which appeared in the *Chinese Students' Monthly* for January.

The Problem of Introducing Rural Credit into China

The Chinese farmers on the whole are very industrious and ready to welcome any opportunity for self-betterment; but their desire and their efforts are hampered by the exploitation of usurious money-lenders. In many Western countries such was the case; but through the elaborate system of rural credit the evil has been eradicated and the farmers enabled to finance their enterprises without being exploited by the usurers. Is this system practicable in China?

In order to answer this question intelligently the subject-matter must be analyzed first. To transplant a system from one country to another must always be accompanied by careful consideration of the social and economic conditions as well as the traditions of the people for whom it is intended. The following paragraphs are devoted to the discussion of the different practices in the West and their practicableness or impracticableness in China.

A rural credit system is a cooperative organization among the farmers for the purpose of securing loans at reasonable interest. Its nature is twofold: (1) Land Credit and (2) Personal Credit.

Land Credit System

Under the land credit system, farmers in a locality organize themselves into an association, through which a member can get loans by pledging his real estate as the mortgage. The members collectively assume full liability for every loan made through the association to any one of them. The mortgage with such collective guarantee of an honest and reputable group of farmers, in most cases, is readily taken by investors even at low interest, and the borrower reaps benefit thereby. The basis of credit under this system is mortgage. This method of financing is chiefly used by large landowners who need big sums for the improvement of their land or for large scale operations. There are generally two ways of securing loans on mortgages: State Aid and Self-Help.

State-aid Land Credit System. Wherever the State gives aid to the farmer's credit, usually large sums of public money are spent in maintaining credit institutions and granting loans on mortgages. The State acts as the farmer's banker. Whenever he needs loans, he looks to the governmental or semi-governmental institutions to meet his needs. Perhaps the best illustration of this system is that of France with the Credit Foncier at the head. This famous institution was established in 1852. Since it has been heavily subsidized with public funds, there is a high degree of government control. The whole system is practically in the hands of politicians. Another example of the state-aid land credit system is found in the United States. The Federal Farm Loan Act, which became a law on July 17, 1916, creates twelve Federal Land Banks. The farmers may organize themselves into national farm loan associations and then, in the name of the associations, apply for loans on mortgages from these banks.

Self-Help Land Credit System. In contrast with the state-aid system is one based on self-help. The landowners who need

loans, instead of relying upon the funds of the government to dispose of their mortgages, organize themselves in such a way as to command public confidence directly, and thus mobilize their own credit. They get loans from the investing public in the form of bond sales on their collective guarantee. This method of financing began in Germany. At present several systems of this type, called *Landschafts*, are in operation and they differ considerably. But the main features are the same. They are all associations of landowners united together to get credit by means of bonds. When a member wants to get a loan, he offers his mortgage to the association and gets back a certain amount in bonds issued against the mortgage by the association on the collective guarantee of all its members. These bonds are then sold to private investors. Sometimes cash is given to the borrower instead of bonds, in which case the association undertakes to sell the bonds directly to the investing public.

Such are the general features of *Land Credit*. Inasmuch as the farmers of many Western countries have prospered by the extensive use of mortgages, it seems imperative that China, also, must adopt this system. But at present there are certain forces in the Chinese nation which tend to make it impracticable. In China the farmers have perfect liberty to sell their land, mortgage it, or give it away; but they choose to keep it and make it a pride of the family. It is entirely different from the situation in the United States, where the farmers regard land as nothing more than the commercial value represented. Chinese farmers have inherited their land from their own ancestors and always regard it as an inalienable heritage. Moreover, they find that all around them are their own relatives or helpful neighbors of long standing. This fact intensifies their affinity for their land and makes it very hard for them to part with it. Therefore, mortgages, which are in fact conditional sales, are always looked upon with horror. They are never used unless absolutely necessary. This spirit, which is generally prevalent among Chinese farmers, is a great stumbling block to any system of land credit. A practice involving mortgages cannot be expected to be looked upon by Chinese farmers with favor. So we have to turn to some other form of credit to solve the problem in China.

Personal Credit System

Under the *personal credit* system the loans are made on mere personal security without any direct reference to the land. This form of credit is more fit for small farmers, who either (1) have no land, or (2) for some reason are unwilling to borrow on mortgages, or (3) only need small sums which do not justify the use of mortgages. It will be readily realized that almost all Chinese farmers are included in these classes. There are also generally two methods of obtaining loans on personal security: State Aid and Self-Help.

State-aid Personal Credit System. According to this method of financing agriculture, farmers are required to organize themselves in small credit societies and then through some intermediate institutions get loans from public funds. In this matter again a good example is found in France. Under the French Mutual Agricultural Credit System there are numerous local credit societies and ninety-six regional banks. These banks get enormous sums provided by the Government and then distribute them to the various local societies on their collective personal security. These societies in turn lend the funds to their members on their personal security. Thus the local credit societies are organized merely for mutual guarantee of government funds. Such a system is also found in several other countries, but the experience is not very encouraging. *State-aid* has led to endless government interference and unreasonable restrictions. For China the state-aid system, which incurs huge sums of public money, is particularly unfit. The Chinese Government is entirely too poor at present, and, in view of the needs for reorganization of various kinds, it will not have funds for this purpose until many decades later. Even if the funds could be secured, there would be great danger of political corruption following government control of the system. Furthermore, in case of emergency, when the Government cannot advance funds, the system is likely to break down—just at a time when the need for sound and stable rural credit is greatest. The writer holds that *an independent, stable, and self-sustaining*

organization is best fitted for Chinese farmers. This is found in the self-help personal credit system.

Self-help Personal Credit System. It was early discovered in Germany, that by well-organized coöperation, farmers could command ample confidence and create sufficient credit facilities for themselves without any undesirable interference from the Government or charity from anybody. The result of that discovery was the Raiffeisen System of rural credit. According to this system, a credit society of farmers, having created public confidence, derives funds from private investors on personal security. A member who needs a loan gets it from the society at low interest but under strict regulations. The success of this system in Germany is marvelous. In 1910 it contained 13,000 local societies with a total of more than one million members. The business amounted to 5,000,000,000 marks in and out. The working capital was 2,128,000,000 marks, of which only 81,000,000 marks or 3.8 per cent were actually owned by the societies and all the remaining 96.2 per cent was from the investing public. This enormous amount of borrowed capital shows what a high degree of public confidence farmers are able to command when they are efficiently organized. This public confidence is highly enhanced by the remarkable fact that ever since the beginning of the system in the middle of the 19th. century, not a single loss has been experienced. This success proves beyond doubt that neither mortgage nor state aid is necessary for the financing of farmers. Let us look into the elements in the organization of this system with a view of its adoption for Chinese farmers.

The Raiffeisen System is based on *four* fundamental principles, which are largely responsible for its success:

1. *Unlimited Liability.* The members of each society are liable for all of its debts. The liability is equal among the members but without limit. This is to insure the confidence of the depositors, from whom they derive most of their working capital. For Chinese farmers, however, limited liability with an ample margin of safety will be more practicable. The success of the system will depend largely upon the participation of the well-to-do and reputable persons in the community. If these are scared away by "unlimited liability," the chances of success will be considerably diminished.

2. *Restricted Area.* Only farmers living together in an area containing not more than two thousand people can be members of the same credit society. This is to make sure that every member of the society has thorough knowledge of every other member, so that no undesirable person can have a place in the society and no unwise loans will be extended. In China each village may well have a credit society.

3. *Gratuitous Management.* This is the keynote of saving thorough coöperation. Expenses are reduced to a minimum and the interest rate on loans is accordingly lowered, as the society is never run for profit.

4. *Self-Help.* These societies refuse state aid and charity and want to be free from unnecessary government interference. Instead of looking to the government for aid, they get their funds from the following sources: (1) Shares sold to members. Usually the amount is about \$5 per share. This forms the initial working capital. (2) Current and savings deposits of the members. Whenever the members have any surplus, they deposit it in the society for loans to others. (3) Current and savings deposits of non-members, who have confidence in the society and desire to get some interest from their idle money. (4) Loans from other sources, such as other credit organizations or commercial institutions.

Losses can be prevented if loans are wisely made. The following safeguards are applied: (1) Loans are granted to members only, and these know each other well. Before the loan is issued the character of the borrower is carefully studied. (2) The purpose of every loan is expressly specified. Every member has the responsibility to see that every loan is used for the purpose stated. (3) No loans are granted for those undertakings which do not have a fair chance of automatic repayment when the time comes. (4) Two sureties are required for each loan, so that if the borrower is unable to repay, they will be held responsible. These safeguards render losses almost impossible.

The foregoing statements refer to individual credit societies. These individual societies are by no means loose and isolated units. They are united together for coöperation in a larger scale. There are Provincial Federations and a National Federation. The purpose of these organizations is to promote the movement and maintain uniformity among the local societies. Another function is the inspection of the methods and condition of the local units to see if every one is run on a sound basis. Besides these Federations there are central banks to equalize and adjust credit in the different sections of the country. When one society has surplus funds, it deposits them in the central bank; when it needs more than it has on hand, it borrows therefrom. The shares of these central banks are held by the local credit societies. All these may be advantageously applied in China when the time comes.

Besides the handling of credit, the Raiffeisen System also undertakes the purchase of supplies and the sale of products. This, too, is worthy of imitation and will give more attractiveness to the society. It will result in great economy to the members and will enable them to enjoy the full benefit of their credit.

The system as outlined above is well adapted to the social and economic conditions of the Chinese people. It is certainly practicable in China.

Further Assurances of Success

The success of a *self-help personal credit system* in China is further assured by the following considerations:

1. In a Chinese village the people know each other very well. In addition to this thorough knowledge there is a high degree of homogeneity in the population. It is not unusual to find all in the same village have blood relationship. They are well united in sentiments. The thorough knowledge and homogeneous character furnish a guarantee for efficient coöperation.

2. Almost all Chinese farmers are small holders, and therefore, the loans they need are small sums which can be easily furnished by a coöperative self-help personal credit system. Since the loans are small, the chances of loss are accordingly reduced, and is, therefore, much easier to achieve success.

3. In the matter of personal credit, the integrity of the man is of fundamental importance. In this respect Chinese farmers, as a whole, can compare very favorably with any other group of men anywhere. Besides honesty they possess industry. These will form a sound basis for a credit system.

4. Throughout the rural districts of China it is a rather prevalent practice for those who have surplus funds to put them in dusty urns and hide them in some inconspicuous corners of the house, and often actually bury them under the ground. When they die, all knowledge of the subterranean keepings is carried to the other world. The reason for such a practice is the lack of a convenient place for safe keeping. When a credit society is organized by honest and reputable men in the community and solicits deposits with interest, the writer is sure that most of the hidings, if not all, will be transferred thereto for safe keeping as well as for interest. These deposits alone probably will be sufficient to meet the demands of the members of the society for loans. It will be a great benefit to the depositors as well as to the borrowers.

With this system introduced into China, where all conditions are so favorable for its successful operation, it is not too much to expect epoch-making improvements in Chinese agricultural life. The farmers will not only be free from usury and exploitation, but will also be educated as to organization, self-reliance, coöperation, and personal responsibility. Perhaps the best and most desired result will be the enhancement of their spirit of enterprise, and, therefore, the speedy development of auxiliary industries with the new capital so as to utilize their spare time and build up a surplus instead of living on the verge of starvation. All these will uplift the farming population and thereby strengthen the foundation of the nation.

In connection with this article of Mr. Chan's the following account of what has been done in the Philippines in the way of introducing a rural credit system in the islands, which was written by Assistant Director Mack Cretcher for a recent number of the

Philippine Agricultural Review, is of great interest. The problems in the two countries are of course utterly different. In China there exists a system of government which would be much more inclined to take advantage of any increased prosperity or well-being among the common people for purposes of exploitation than to finance or foster an initial movement, while in the Philippines a benevolent administration puts an intelligent and thoroughly honest organization at the service of the people and coaxes the people to care for their own interests. In China any movement for the benefit of the people would have to grow out of the common sense of the people themselves and its maintenance would depend solely upon their ability to organize and their peculiar genius for financial adjustments. The value of Director Cretcher's account of the work done in the Philippines is in the suggestions which it gives for systematizing simple coöperative banking on the very small scale with which any Oriental community must begin such a movement. The following is a reproduction of the article which appeared in the *Agricultural Review*.

Rural Credit in the Philippines

The remarkable growth of the coöperative idea, especially as applied to rural credit operations, has attracted world-wide attention, and is worthy of careful thought and honest effort by all progressive people. In every country in which coöperation has made progress there have been opposition and difficulties to overcome. This has been particularly true in the Philippines where farmers are isolated and established over a vast territory where means of communication are inadequate, where there is lack of a common language and where the baleful influence of usury has become an entrenched, established custom.

The urgent need of some sort of rural credit has been felt in the Philippines for many years. Working capital is essential to the agriculturist and it has been beyond the reach of the small farmers except at ruinous rates from usurers. It has been demonstrated in other lands that in union there is strength, and the desirability and necessity for the uniting of agriculturists for mutual defense against usurers and produce speculators has been recognized. In Europe the small agriculturists provided the money needed for their operations. They evolved a plan of coöperation where by joint effort they created security. This security attracted deposits and was accepted for loans of capital. Suitable rules were made by the people themselves for the conduct of their credit banking business. Reports for the year 1912 show that there were 65,000 successful coöperative peoples' banks in Europe with over five million dollars of active capital, all gathered from the people and loaned to the people without any government money or management entering into the transaction.

Realizing the importance of this wonderful record and convinced that in time and possibly in amended form it was capable of adoption in the Philippines, the first steps toward the education of the people concerning coöperation were made during the latter part of the year 1914, when a campaign was launched by the provincial government through the Bureau of Agriculture for the organization of agricultural societies throughout the provinces. This work was so successful that early in the year 1915 provincial agricultural societies with a membership composed of leading agriculturists, had been formed in over twenty provinces, and under these parent or governing societies, branch or municipal societies were formed in nearly three hundred municipalities well distributed throughout the Archipelago, with a total membership of over twenty thousand farmers. There has been a steady growth and extension of these agricultural societies since that time. The object of this organization was that of systematic agricultural education concerning the principles of coöperation, thus paving the way for the establishment of rural credit, coöperative work-animal insurance, irrigation projects, coöperative marketing, and other enterprises of mutual or community interest.

The first definite action taken toward the establishment of rural credit in the Philippines was the enactment of Act No. 2508, known as the Rural Credit Law, by the Philippine Legislature, February 5, 1915. This act provided for the organization of

associations to be denominated "Agricultural Credit Coöperative Associations," and stated that the purpose of the aforesaid associations should be to "accumulate funds, by means of coöperation, in order to extend to their members credit on reasonable terms for exclusively agricultural operations, and to encourage thrift, activity, and punctuality in meeting obligations among said members."

Although the preliminary organization leading toward coöperative effort on the part of the people had all been handled under the supervision of the Bureau of Agriculture, the control of the proposed rural credit organizations was placed in an entirely different department of the Government service, Sec. 43, of the act specifically delegating this power to the Executive Secretary. This provision was remedied by the legislature by an amendment passed February 3, 1916, which placed the administration of Act No. 2508 in the hands of the Director of Agriculture and made other minor changes in the original act. In the meantime, however, a whole year had elapsed without even one rural credit society being formed under the new law. This delay was not entirely due to the provision above stated. The people were not in a particularly receptive mood for progress along coöperative lines and additional educational work was required. Farmers the world over are conservative and slow in adopting new and untried methods, no matter how promising. There are thousands of instances that substantiate the above statement. In Ireland, under Sir Horace Plunkett, after a coöperation law had been passed, it took fifty meetings to organize the first society. To-day there are in Ireland over 100,000 farmers engaged in coöperative business transactions, the total volume of their business amounting to over fifteen million dollars annually. In France and Germany those who secured the enactment of coöperative laws discovered that the people they sought to benefit were slow in appreciating what the new legislation meant and a thorough campaign of organization and education had to be carried out before the societies were formed which became the very basis of agricultural progress in Europe. The state of Massachusetts enacted a credit union law for its farmers in 1909, and in 1911, after two years had elapsed, the committee in charge made a report deploring the fact that the provisions of the law had not been taken advantage of by the people, thus showing that agricultural legislation without proper organization and education was practically useless. This same situation is particularly true in the Philippines where "custom" is followed with almost religious tenacity, and it is therefore little wonder that progress in rural credit was slow and at times discouraging.

Having determined upon an aggressive and persistent campaign for the organization of rural credit societies, the Bureau of Agriculture took the first active step in the matter on August 25, 1916, by forming a rural credit section in the Bureau, of which Mr. A. W. Prautch was appointed chief. Mr. Prautch at once organized an office force and commenced work with vigor and enthusiasm. Plans of the campaign were perfected, tentative by-laws were drafted, forms were outlined, books, records, and blanks were adopted and approved by the Director of Agriculture, a system of auditing the societies' records in conformity with the law was arranged with the Insular Auditor—a seemingly endless procession of details before actual work could begin.

The first rural credit society in the Philippine Islands organized under Act No. 2508, was perfected at Cabanatuan, Province of Nueva Ecija, October 19, 1916. Progress since that time has been quite satisfactory. At the outset, two different plans of organization were considered, one having in prospect the organization of only a limited number of societies, these to be given the most minute care and supervision at every step of their progress, thus working out surely the idea of coöperative credit in these limited instances, their labors thus becoming a successful experiment and a guide for a more extensive campaign at a later date. The other plan proposed the extension of the organization of societies as rapidly as possible from the start. Each plan had its advantages and its unsatisfactory features. The first plan gave the thorough, careful supervision so greatly needed by a new and untried enterprise, but extended the benefits of the law to only a limited number of people. The latter plan meant a rapid extension of the idea

over a large portion of the islands, but naturally precluded the possibility of careful supervision, instruction, and guidance from the Central Office, as there is a limit to the activities of a small though efficient office force. As usually results, the Office kept well on safe middle ground between these two extremes, organizing more societies than could be given personal supervision in every instance, yet not extending the organization in a haphazard, indiscriminate manner.

Thus the work has progressed very satisfactorily, so that now, one year after the organization of the first society, there is an ever-increasing demand for rural credit societies. The growth of the societies has been healthy and encouraging. The reception of the idea of rural credit has been most hearty. Provincial governors, local officials, leading farmers, and prominent citizens in general, have enlisted for the rural credit campaign and have freely given their services in the work of organization.

Under Act No. 2508 all rural credit organizations must incorporate in accordance with the Philippine Incorporation Law (Act No. 1459). There must be not less than five nor more than fifteen incorporators. From these incorporators a board of five directors is selected. Twenty per cent of the capital stock must be subscribed before incorporating and 25 per cent of this subscription must be paid to the treasurer at the time of incorporation. Shares to the full amount of the capital stock may then be issued and sold. Act No. 2508 limits individual's holdings to \$250, and each member of the association is limited to but one vote irrespective of the number of shares held. Par value of the shares must not exceed \$2.50 each. The usual price of shares in most associations has been placed at \$1, this popular price making them attractive to the man of small means. The law grants special exemptions and privileges to the associations. There are no fees or charges for incorporation and no taxes until the paid-up capital exceeds \$5,000. They are also exempted from court fees payable to the Insular Government for actions brought under this Act or to enforce the payment of obligations contracted in favor of the association.

Once incorporated, the association may engage in the following operations: Extend credit to the members of the association for securing title to and registration of their land under Act No. 496 and for purchasing and securing title to new agricultural land; for the purchase of live stock, fertilizers, preparations for the destruction of pests of various kinds, and for the purchase of seeds, machinery, or implements which the borrower shall use for agricultural purposes exclusively; for the redemption of incumbrances on agricultural land; for the cultivation and improvement of such lands; for the expenses in connection with the planting, cultivation, harvesting, or care of any agricultural crop or product, or storage and housing until sold or marketed; upon gathered products stored in a safe place and at the disposal of the association, in a sum not to exceed 50 per cent of the fair market value of such gathered products; and for the construction, repair, and maintenance of works of irrigation or drainage of land. Associations are further authorized to open credits in current account, with interest, with the members of the association; to acquire or purchase seeds, fertilizers, preparations for the destruction of pests of various kinds, machinery, live stock, and agricultural implements of any kind and sell the same to the members of the association; and lastly to contract loans and receive deposits in order to increase their working and circulating capital.

By this last clause it may be seen that it is not the intention to have the association provide all the capital, but that they shall establish a security by which they may increase their working capital by securing money as loans from outside sources.

Commenting upon the operations of the rural credit law, Mr. Prautch, in one of his reports, says: "In practice the application of the machinery of this law is very simple. There is a sum of money, large or small, in the hands of the treasurer at incorporation. The amount depends largely on the confidence that has been created by those who presented the matter to the general public. The directors meet and receive applications for loans. They decide on the merits of each case. The poorest and neediest who have a legitimate productive use for the money are

considered first, as the association is limited by law to one municipality. The character and reputation of each applicant is known and if he furnishes two securities to sign his note to guarantee its prompt payment, the loan is voted and the president and secretary are instructed to sign a check for the amount on the municipal treasurer, who is by law ex-officio treasurer of the association. When the funds have been loaned out and there are unsatisfied applicants for loans the directors will feel impelled to sell more shares to increase the capital stock to meet the growing needs. Each loan received by a small agriculturist is an argument among his neighbors that these associations are practical. They do not understand the system or its working but they see the real money that has been loaned at 10 per cent a year to their neighbors and they buy shares and an ever widening circle of influence is at work. Everything depends on the character, activity, and public spiritedness of directors. Unfortunately there are associations in which the directors were selected by the members on their social merits, therefore the fine machine of rural credit is not working at all or on very low pressure. Even the most discouraging associations are not entirely hopeless. The visits of the agents have a helpful effect, the information of what other associations are doing acts as a stimulant, and a new election may change the board. It must always be remembered that these incorporated associations have the right to carry on their business in their own way provided they do not violate the law. Our power is merely advisory."

The law requires that sufficient security be taken for each loan. Three kinds of security are permitted, personal, chattel mortgage, and real estate mortgage. Personal security is defined as "a bond signed by two or more persons of recognized solvency in the municipality." Associations have been advised to make only small loans of \$50 or less, emphasizing the fact that a note signed by the borrower and two indorsers is good security and less troublesome than a mortgage on crops, implements, cattle, or real estate. Loans cannot be made for a longer period than one year, but they may be renewed if in the judgment of the board of directors there is valid reason for so doing. The rate of interest is limited to ten per cent per annum. Loans may be made only to members of the associations, and every member is required to own at least one share of stock. No director is permitted to vote on a loan for himself or for any member of his family. The combined credit of the association serves as an inducement to secure deposits not only from members but from outsiders as well, thus adding a savings-bank feature and also increasing the loaning capacity and working capital of the institution. As a guarantee of safety for depositors, the law limits the amount of deposits that may be received to a sum equal to the capital stock and by further declaring that the entire assets of the association shall be available to guarantee depositors, who shall have a prior right to said assets as against all other creditors. Provision is also made for a reserve fund which consists of a sum set aside by the board of directors from the net profits at each annual balance prior to the distribution of any dividend, said sum to be not less than twenty per cent of the net profits.

The administration and government of these associations is largely in the hands of the members, although there is Government supervision and audit and as a further measure of safety, the funds are held by the municipal treasurer, a bonded official, who is by the law made ex-officio treasurer of the association. Arrangements are made for the transaction of business at a stockholders' general assembly which shall be held at least once each year. The Insular Auditor, through his deputy, audits the association accounts at the same time the municipal funds are audited. The Director of Agriculture or his deputy examines the working of each association at least once every six months to see that the provisions of the law are being properly observed.

These associations represent a simple form of banking. When the people of a community have collected a sum of money by coöperation, they all feel a personal interest in their enterprise and watch the loans made and the security given. The utmost publicity is invited. This stimulates interest and attracts new members; thus the funds and the ability to administer them, advance together. The very struggle at the beginning, to secure

funds, makes better and more self-reliant members and promises greater success than if all difficulties and obstacles had been removed by mistaken but well-meaning philanthropists.

Concerning the actual operations of the law, Mr. Prautch says: "Many of the founders of these associations are or have been members of the municipal council, so parliamentary usage and keeping the minutes and administering the affairs of the association is not unfamiliar and dozens of copies of resolutions and minutes of the meetings of the boards of directors are sent in which are entirely satisfactory and prove beyond a doubt that the plan is feasible and adaptable to the people of this Archipelago. Naturally the same degree of interest is not taken in every association nor has the same progress been made but there are encouraging features which bespeak a brighter future. It must be borne in mind that, first of all, the money belongs to the people themselves. Act No. 2508 permits and encourages them to administer their affairs and they permit only such to join as are of good character. This feature if strictly adhered to will go a great way toward making safe and helpful loans. The board of directors carefully examines the applications for loans and if satisfied on every point the loan is granted. The man who receives the loan would not injure his chances for future loans by defaulting and compelling his bondsmen to pay. Those people are the only friends he has, as that is the world he moves in. A moment's reflection will convince one that these associations appeal to the strongest ties that human beings possess—a sense of brotherhood. They do not approach sentimentalism nor, on the other hand, are they so fiercely commercial that they cannot be helpful. Careful business rules govern all the transactions, but a man is not made to feel that he is suspected of being a swindler or thief when he applies for a loan. He feels a confidence in an institution in which he is a part owner and he will value and respect the membership more and more as his understanding of the plan and its utility is enlarged by experience and observation."

These credit associations are unquestionably training people with limited ability and small means, to grow by their own efforts. They provide a place to borrow as well as to deposit funds. They enable a person to state his financial needs to his neighbors instead of to strangers. If the association starts with only \$100 capital, it is possible to make at least ten loans of \$10 each, and the value of these loans to the borrowers can be appreciated only by those thoroughly familiar with usury as it is practiced in the Orient. The plan for advancement and growth is elastic and progress depends upon the coöperation of all. No better system is known to develop self-help, to enable self-respecting people to create a system of finance for themselves without asking or receiving charity or gifts. A great advancement toward the economic independence of the Filipino people will be made when the money now taken from the small agriculturist in ruinous interest, remains with him through the agency of these rural credit associations.

The movement is growing. Counting the associations that have completed their organization but have not yet incorporated owing to all the subscribed capital not having been collected, there are, at present writing (October, 1917), over one hundred rural credit associations already established in the Philippine Islands, representing a combined capital stock of over \$150,000, of which over \$40,000 has been paid in. This is loaned out in sums ranging from \$15 to \$50 to small farmers for strictly agricultural purposes. In addition to this local capital, four associations have had \$500 each deposited with them to increase their working capital. Once confidence is thoroughly established, it is expected that this will be one of the best sources of obtaining sufficient working capital. As there is a constant propaganda carried on to increase the membership in each society it is hard to give accurate figures but a safe estimate places the total membership at over 20,000 people who are interested in these associations to the extent of having purchased shares. Nine associations adopted the price of \$2.50 as the par value of their shares. The others have placed the value at \$1 per share. Interest in rural credit is growing rapidly. One of the most hopeful features is that the people no longer depend upon the Bureau of Agriculture for the organization of associations. The governors of provinces, presidents of municipalities, senators,

representatives, and public-spirited citizens in all walks of life are taking an active part in the campaign by pointing out the benefits of rural credit and explaining the plan in order to remove suspicion and prejudice. This, with the hearty indorsement by the members who have given the plan a trial, added to the cordial support of the public press, indicates that advancement in the future will be satisfactory and encouraging.

Only a start has been made it is true, but it is a start and a good one, based upon sound economic principles. The smallness of the loans and the limited capital secured may appear to be insignificant to men of large affairs, but it should be remembered that it is just such a class of small farmers, small investors, small borrowers, that this system is designed to help. Big business is reasonably well taken care of in the Philippines. There are large banking institutions that have ample facilities for

taking care of a great portion of the commercial and industrial transactions of the country. In addition to these big banking institutions there is the recently organized Philippine National Bank, a Government institution with a capital of five million dollars. None of these institutions are so constituted, however, that they may render aid to the small agriculturist who is poor, has no Torrens title to land to offer as security, yet needs assistance as much as any one and heretofore has had no recourse but to fall into the clutches of the ruinous usurer, which has kept him in a condition of semiservitude. The progress made in developing rural credit may appear small, therefore, but it is reaching a class of people that can apparently be reached in no other way, and is aiding them by simply teaching them how to help themselves profitably through coöperation and mutual confidence.

China and Her Food Problem

Necessity for a Fertilizer Program

The most vital question of national economics in any country is the provision of a sufficiency of food for the population. Such needs are always growing in a rising country because of the national increase of numbers and because of the inevitable lift in the standard of living that invariably attends progress in national prosperity. If there is no natural increase of population in times of peace the conclusion must be that disease and insufficient nourishment together take a toll of human life equal to or greater than the annual birth increment. If there is no rise in the scale of living then one is forced to say that stagnation or even retrogression has begun in the industrial and social life of the country.

In China more than in most countries the food supply question ought to call for the most earnest, persevering, and thoughtful attention on the part of all her public men. The pressure of human lives on the means of subsistence is very marked within her wide borders. The hopeful elements in the situation are however not few, particularly in the very folks themselves, for Chinese farmers are first-class handlers of soil.

Improvement of Chinese agricultural facilities might develop along various lines in different provinces according to the nature of soil conditions, the local density of population, and the capital available for fresh investment in agriculture.

It would certainly take an optimist of the first degree to vision any progress in the near future toward machine agriculture in China. Human labor is too good, too plentiful, and too cheap to call for economy thereof. Progress would be along lines of less resistance if improvements in seed selection and in encouraging the use of fertilizers were aimed at.

The application of fertilizers is one method of conserving soil fertility which in the 20th century cannot be overlooked by any country. Conservation of fertility may be partly secured by various methods each aiming at a different portion of the same great end; viz., increased production of crops from the same area of land with the same expenditure of labor. Everything done to prevent soil erosion or damage by rain or flowing water: all utilization of waste materials like ditch cleanings, road scrapings, ashes, etc., are phases of fertility conservation.

It is impossible to get back to a period in the history of the world's agriculture when farmers did not utilize excrements—animal or human—to promote crop production. Everywhere "muck" or "manure" has long been in use. It is only, however, during the past century that most of what are now termed "fertilizers" have come into general use in Western countries. Among Eastern countries, Japan alone has adopted and assimilated the knowledge of fertilizers and their uses—a knowledge that has been of the greatest help to her whole national progress especially in the last twenty years.

Fertilizers Free of Customs Dues

At a time when the Chinese Maritime Customs Tariff is under discussion for amendment, improvement, and adjustment it would be well for China's friends to bear in mind that all materials used or classed as "fertilizers" ought to go on the free list. All substances to be used for increased production of food ought to be free of import and likin duties; their import ought to be encouraged by liberal open regulations and every opportunity ought to be given for the spread of fertilizer knowledge in rural areas. All the substances mentioned hereafter ought to be admitted duty free to China as is the case in Japan and most other countries.

Vegetable Nitrogenous Fertilizers.—Most important and necessary for vigorous plant growth are all materials supplying suitable nitrogen compounds. China produces many fertilizers of vegetable origin which Japan is only too happy to purchase cheaply because China does not appreciate their use. Japan's imports of vegetable fertilizers are as follow:

	1917	1916	1915	1914	1913
	tons	tons	tons	tons	tons
Bean cake	983,460	771,018	735,660	622,655	271,150
Rapeseed cake	44,600	33,737	39,804	65,410	86,420
Cotton seed cake	28,600	29,424	45,212	44,162	40,505
Other oil cake	10,000	1,502	3,296	5,145	4,115

As already pointed out most of this is obtained from China—the bean cake from Manchuria and the others mainly from the Yangtze valley, though even India is now the source of some of Japan's vegetable fertilizers.

It is true that in Western eyes Japan's use of these vegetable cakes directly as fertilizers does not appear specially economical. In countries where animal husbandry is more practiced, most of such material would first be utilized as animal food and through the animal excrements a large percentage of the fertilizing ingredients of the vegetable cakes would reach the soil.

Animal Nitrogenous Fertilizers.—Where fish is more abundant than is necessary for human food we find the industry of fish oil extraction with by-product residues useful as fertilizers. Some varieties of fish like menhaden and others are not utilizable as food and the whole catch is available for oil and fertilizer. In the same way the waste from fish canneries comes on the market for fertilizer purposes. Likewise the by-products of land animals—horns, hoofs, wool waste, waste hair, waste feathers, dried blood, slaughter house tankage, are important items in the world's fertilizer trade.

Chemical Nitrogenous Fertilizers.—In a rice growing country, like at least the southern half of China, one would expect to find

sulphate of ammonia in common use. As a matter of fact, the output of sulphate of ammonia by the Shanghai Gas Company is usually purchased every year by Japan. There is in Japan an annual demand for more than 100,000 tons of sulphate of ammonia, and Japan's rice production problem would be much more serious but for the use of sulphate of ammonia. The great European War has caused Japan to search within her own bounds for new sources of sulphate of ammonia, and she is now turning out as products or by-products of her own industries some sixty to seventy per cent of her own requirements of this fertilizer. Most is produced by two electro-chemical companies from calcium cyanamide, which at present prices is being profitably converted into sulphate of ammonia.

There is nothing more fatuous than China's attitude towards the great nitrogenous fertilizer Chilean nitrate of soda, the annual production of which is over 2,500,000 tons. In times of peace seventy-five to eighty per cent of the total annual output is employed as an indispensable nitrogen manure for all crops not grown under continuous irrigation. Such crops as mulberry, sugar cane, cotton, tea, tobacco, vegetables, all grain crops,—all come under this heading, and as we have pointed out, China ought to have a special interest in the results of using nitrate of soda or mulberry in Japan. Not only in Japan in the Far East has nitrate of soda established itself as an invaluable nitrogen fertilizer. Java has for the year endash 1917-18 taken about 35,000 tons of nitrate direct from Chile from use on her valuable sugar cane crop.

From of old bones ground down to powder have been used as phosphate fertilizer and they are still extensively used in all countries. The rate of assimilation of bone phosphate by plant roots is, however, slow and for about eighty years a more easily absorbed form of phosphate fertilizer has come into general use. This "superphosphate," or "acid phosphate," is obtained by dissolving, in sulphuric acid, rock phosphate finely ground. All crops where the product aimed at is seed or grain should have their phosphate requirements carefully studied and attended to.

Education in Fertilizer Use

Town dwellers and office holders are apt to under-rate the empirical and intuitive knowledge acquired by farmers in the long centuries during which agriculture has been practiced. There is nothing new in the theory of the application to crops of modern fertilizers. Their use is merely an extension of the application of waste materials and excrements that one finds already carried out in China.

Furthermore, various groups in the fertilizer industry of the world each maintain an educative section of their work and alongside the sale of the various materials there is diligently pursued a campaign of enlightenment as to the very best methods of use. Thus China, in order to reap the full fruit of free trade in fertilizers within her borders would not need to go to the expense of establishing and maintaining an army of fertilizer experts to direct and control the traffic.

Every one with an agricultural eye admires the manipulation of soil by Chinese cultivators and has perfect faith in the rapid adoption and correct use of fertilizers by a race whose commercial instincts are keen. All that is necessary is to have hindrances in the way of imports removed and a chance given to show that the present food output of China can be largely increased.

The Engineer in the Tropics

[FROM OUR SOUTH CHINA ENGINEERING CORRESPONDENT]

The really important question, which the war has made more important than would otherwise have been the case, for this generation, is the development of the natural resources of the tropics. This is a problem which involves a very large part of China. The wealth which is latent in the tropical part of the Celestial Empire is almost beyond computation. And the wealth which the Chinese as a people will be instrumental in developing is very much greater, for it includes not only China but those great areas of land which lie to the South of the Chinese border and which include Malaya and the Eastern Archipelago.

A consideration of Malaya alone reminds us of the remarkable growth in wealth of that part of the world. This increase has been almost entirely due to the development of two different kinds of natural sources. The tin from Malaya has been exploited by industrious and farsighted Chinese mine-owners, but these, even now, do not use the most up-to-date methods of mining this precious metal and no doubt very great improvements will be made in the near future by introducing more machinery. But it is not only tin that has been exploited by the Chinese in the British Protectorate. Rubber has flourished under the tropical skies, and yet rubber was almost an accident in this part of the world. It is, perhaps, well known that not very long ago somebody imported to Singapore a few small rubber trees from the famous Kew collection in London, and nobody was very sanguine of the result. The original trees came from Brazil; but there was some one in London whose business or whose pleasure it was to study this question of rubber production, and that is why the trees went from London instead of from Brazil to that place which is now famous for the production of rubber. It is perfectly true to say that the demand of rubber has increased enormously, chiefly owing to the development of motor cars, but still if the Brazilians had been more enterprising than the man in London they would have cultivated rubber to such an extent in its own natural environment that we should never have heard of it in Asia for many years. The moral of the story is very evident. Nobody denies that the Chinese farmer, in the tropics or elsewhere, is a master of intensive cultivation; but here again we come up against the very unfortunate fact that all his knowledge has been gained from the experience of those who tilled the same ground for generations before he followed in their footsteps. It will be found in the very near future that there are other crops which may be grown on these farms, and which will be more profitable; and while it would be foolish for an engineer whose knowledge of agriculture is only superficial to dogmatize as to the nature of these crops, we may be sure that plants as well as ideas will be imported from abroad.

America's Car Conservation

An interesting article upon car conservation in China, by Mr. J. E. Baker, adviser to the Ministry of Communications, appeared in the May issue of the FAR EASTERN REVIEW, in which some space was given to contrasting the service which the Chinese railways get out of a freight car with the work done by cars on the American railways.

Since the publication of this article Mr. Baker has written us the following interesting supplementary note upon this discussion:

In the article on car conservation in China the concluding paragraph draws attention to the point that Chinese car performance proves what may be expected of American railroads under the spur of war necessity, when that necessity is fully appreciated. Since it has been proved that some of the shipping difficulties have come about from the partial demoralization of the American railroads, as well as from an actual shortage caused by submarine raids, it is hopeful to know that American railroads are now becoming masters of the situation. As evidence of this, the following published recently by the *Southern Pacific Bulletin*:

"Freight cars and locomotives on the Pacific system of the Southern Pacific are doing three times the service they were three years ago. In January, 1915, the average freight car did work equivalent to carrying 9,000 tons of freight one mile. By the beginning of this year our average freight car was hauling 25,000 tons. A like improvement is seen in the work done by locomotives. On the average a locomotive hauled 412,000 ton miles of revenue freight in January, 1915, and 1,300,000 on the first of this year."

This is on a system of about 8,000 miles of line, but during a season when few difficulties were encountered from weather. It indicates what may be expected from other lines now that they are out of the clutches of King Winter. The reserve power evidenced in this way is very significant of the future of American war preparations.



THE CITY OF IRKUTSK

Mines Abandoned to the Bolsheviki

Mr. A. F. Hallett Tells How Foreign Investments Fare in Siberia

Some idea of the difficulties which have confronted enterprises in those territories in Russia, or regions contiguous to Russia proper, such as sections of Siberia, which have come under the control of the Bolsheviki, was given our Tokyo office by Mr. A. F. Hallett, who was engaged by the Irtysh Corporation of London to act as chemist at their zinc and lead smelting works at a place called Ekibastus, some three hundred miles south of Omsk, on the desolate Kirghese Steppes.

Mr. Hallett was but six months in the country. He went in with his wife in August, 1917, and was forced out in March, 1918. To get to the scene of operations was a trial in itself. Upon arrival in Japan from America, three weeks had to be spent before accommodation on the trans-Siberian railway as far as Omsk could be secured.

Six days of uncomfortable existence on the train brought the travelers to Omsk at two o'clock in the morning, and, the following day they boarded a river steamer, propelled by side paddle wheels, for their destination, and except for being locked in their cabins while the vessel steamed under an immense bridge—this precaution being taken to prevent any effort being made to blow the bridge up—the voyage was fairly enjoyable. The river runs a tortuous course through vast cultivated plains. Haystacks and windmills dotted the landscape as far as the eye could reach.

Pavlodar is the capital of the province, and twenty-five miles farther on is Voskresensky, which is situated on the river bank and is the starting off place for the coal mines and smelters of the company, a railway eighty miles long providing the means of transport. The country round about, as all along the river, was under cultivation, in normal times, the reapers and binders being drawn by camels. But after the Bolshevik accession to power the peasants concluded that no further work was necessary, and looked to the State to provide all their wants while they lazed with easy minds.

Ekibastus, the mining camp, was reached on September 11, just two months after leaving America.

The camp is situated eighty miles west of the Irtysh River, some three hundred miles south of Omsk. The surrounding

country is very flat and absolutely without trees. The only vegetation is scattered patches of thin grass, which grows no higher than two or three inches. The ground is stony and covered with loose flinty fragments of rocks and pebbles. The farming districts are confined to the river sides, where the soil is better, and in a few widely scattered areas on the Steppes. For the most part the Steppes are fit only for grazing.

The houses are built of sun-dried bricks, the walls being two or three feet thick. They are one-storied, with the usual double windows to keep out the cold. All are heated by Russian tiled stoves. The city has nothing to recommend it, and consists of a collection of detached houses scattered along the sides of a quadrangle about a quarter of a mile across. There is a barnlike structure where the inevitable movie show is occasionally held, but nothing else in the way of amusement offers. The population is mostly Russian and natives of the Steppes, the Kirghese, and about one thousand prisoners of war, who worked for the most part in the coal mines.

In the vicinity of the town are the lead and zinc smelters, while farther off are the three shafts of the coal mine. The ore treated at the smelters is mined and concentrated at a place called Ridder, in the Altai mountains, two hundred miles south-east of Semipalatinsk. It is sixty-three miles from Ust-Kamenogorsk on the Irtysh River with which it is connected by a railroad. This property is operated on a seventy-two year lease on a small royalty basis from the Russian Government. Mining developments have shown that the ore body is at least 750 ft. long, with an average width of thirty-six ft., and a vertical depth of 540 feet. The ore is a mixed sulphide of zinc, lead, iron, and copper.

The mine is capable of producing six hundred tons of ore per day, but with the existing plant the output is limited by the capacity of the mill to one hundred tons. A recent report estimates a profit in sight of nearly \$53,000,000 (gold).

In March, 1917, according to a report in the *Engineering and Mining Journal*, the Ridder mine produced 1,629 tons of ore. The mill treated 447 tons yielding 17.4 tons of zinc concentrates and 46 tons of lead concentrates.



(SIBERIA) FROM THE RIVER

The concentrates are brought from the mine to the railway at Voskresensky on barges, and are then carried by rail to the coal supply. Eight hours are required to travel the eighty miles on the line, which is of the usual wide Russian gauge. The speed of the trains is regulated to preserve the rolling stock, further supplies of engines and cars being unobtainable. The cars are short, and as the gauge is wide a train has the appearance of a long string of square boxes mounted on wheels.

The shafts at the mines average a depth of 400 feet, and yielded 75,000 tons p. a. of bituminous coal, which was hewn and handled by some 800 to 900 men, mostly Czechs who deserted from the Austrian army—and thus are so-called prisoners of war—and Kirghese. The coal seams have an aggregate thickness of 240 feet, the coal basin being eight miles long and three wide, and is estimated to contain sufficient coal to fulfill the purposes of the company and supply consumers in the vicinity for several centuries. In March, 1917, the company produced from the mines 8,638 tons of coal, and 642 tons of coke.

The zinc smelter started in August, 1916, with one block of retorts having a capacity of 150 tons of spelter a month. When complete the smelter will have twenty blocks of retorts. The concentrates are calcined in duplex Merton calciners before going to the retorts. The zinc furnaces are of a modern type and gas fired.

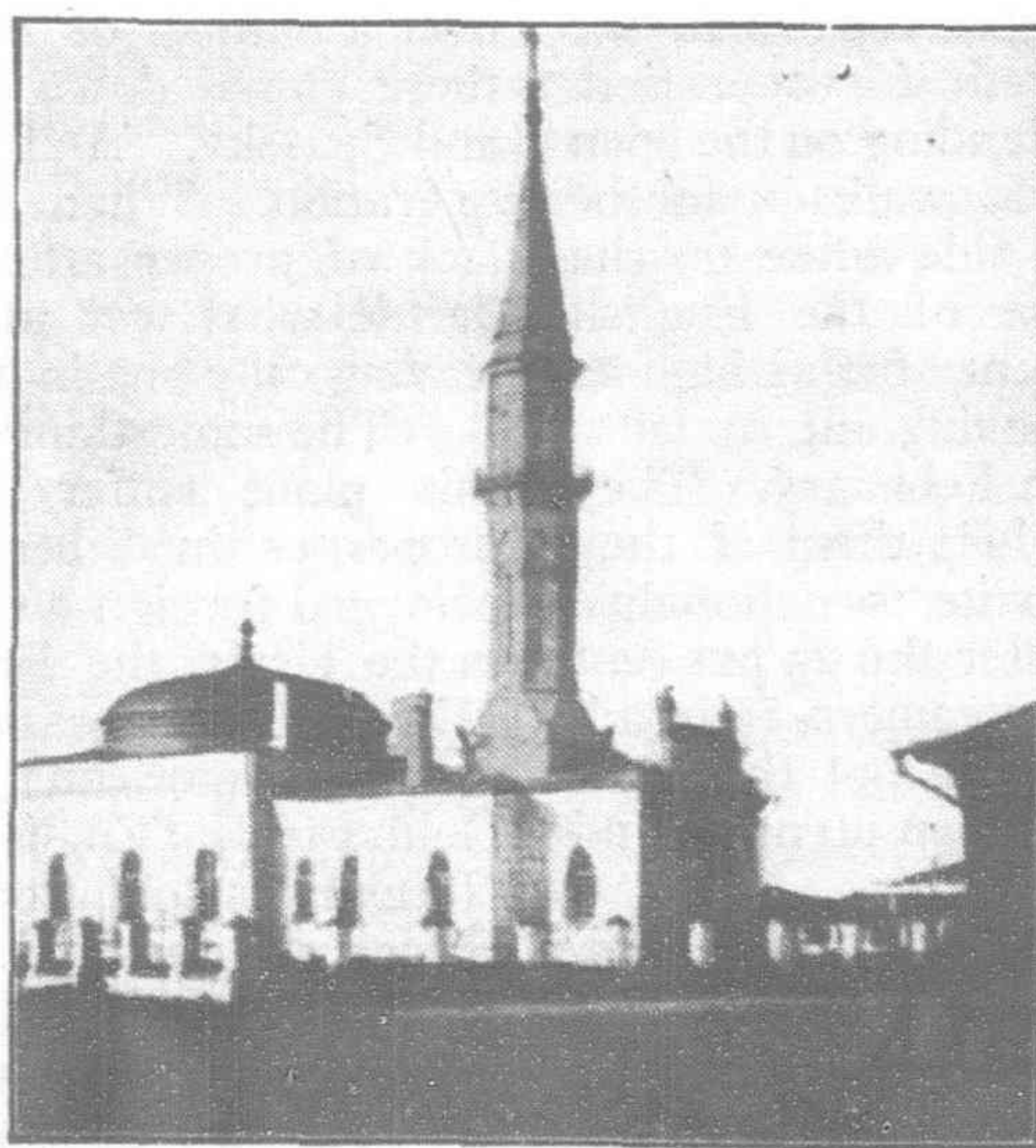
The lead smelter has been under construction for nearly two years. The smaller of the two blast furnaces ran for two or three weeks in the winter, but could not continue on account of labor troubles and shortage of materials. The larger blast furnace was not completed owing to the difficulty in securing supplies. About twenty tons of lead bullion were produced by the small furnace. The lead plant is also equipped with a refinery, softening and drossing furnaces, Howard press, and stirrer, desilverization kettles and a tilting furnace. The lead plant sheet down in January and had not resumed operations up to the time Mr. Hallett left Ekibastus.

Then came the Bolsheviks into the region, and although they did not at once affect the operations of the company they caused unrest and trouble throughout the winter. Five Bolsheviks at the coal mine were the cause of much disorder, and soldiers were sent

to arrest them. Twenty-five arrived, marched to the mine, and promptly went into conference with the disturbers of the peace. The Bolsheviks were able to persuade the soldiers to leave them in peace, and with the retirement of the troops the field was open to the machinations of the mischief-makers. And they made good use of their opportunity. As a result of the disturbances caused in other parts of the country by their fellows no money could be secured by the coal mine officials from the banks. For three months no wages could be paid, and no money was available to purchase stores to replenish the only shop in camp—one run by the company. Food became scarce with the advent of winter, and throughout the intensely cold and long months the only diet available was black bread, tea without sugar or milk, frozen cabbage, and some meat. Bad weather and lack of money made it impossible to get meat except at intervals. At different times piles of frozen meat were brought to town by the Kirghese on sledges drawn by camels. There was never enough for all, and often it could not be had at any price. The canned goods, dried fruits, and preserves gave out in November, and no more came in. All through the bitter winter no eggs were available, nor were potatoes, butter, or cheese. A few pounds of rice were occasionally obtained. During the worst of the winter Mr. and Mrs. Hallett had a Czech prisoner for a cook, but he eventually left without ado, explaining, when later accosted and asked for a reason, that he left because there was no food to cook. At that

time the diet was black bread and tea, and soup made by boiling lumps of bread and a handful of dried peas in water. An improvement in this diet was possible occasionally by the addition of frozen cabbage and a little meat. The allowance of sugar was first reduced to five-eighths of a pound per month per person, and then it gave out entirely.

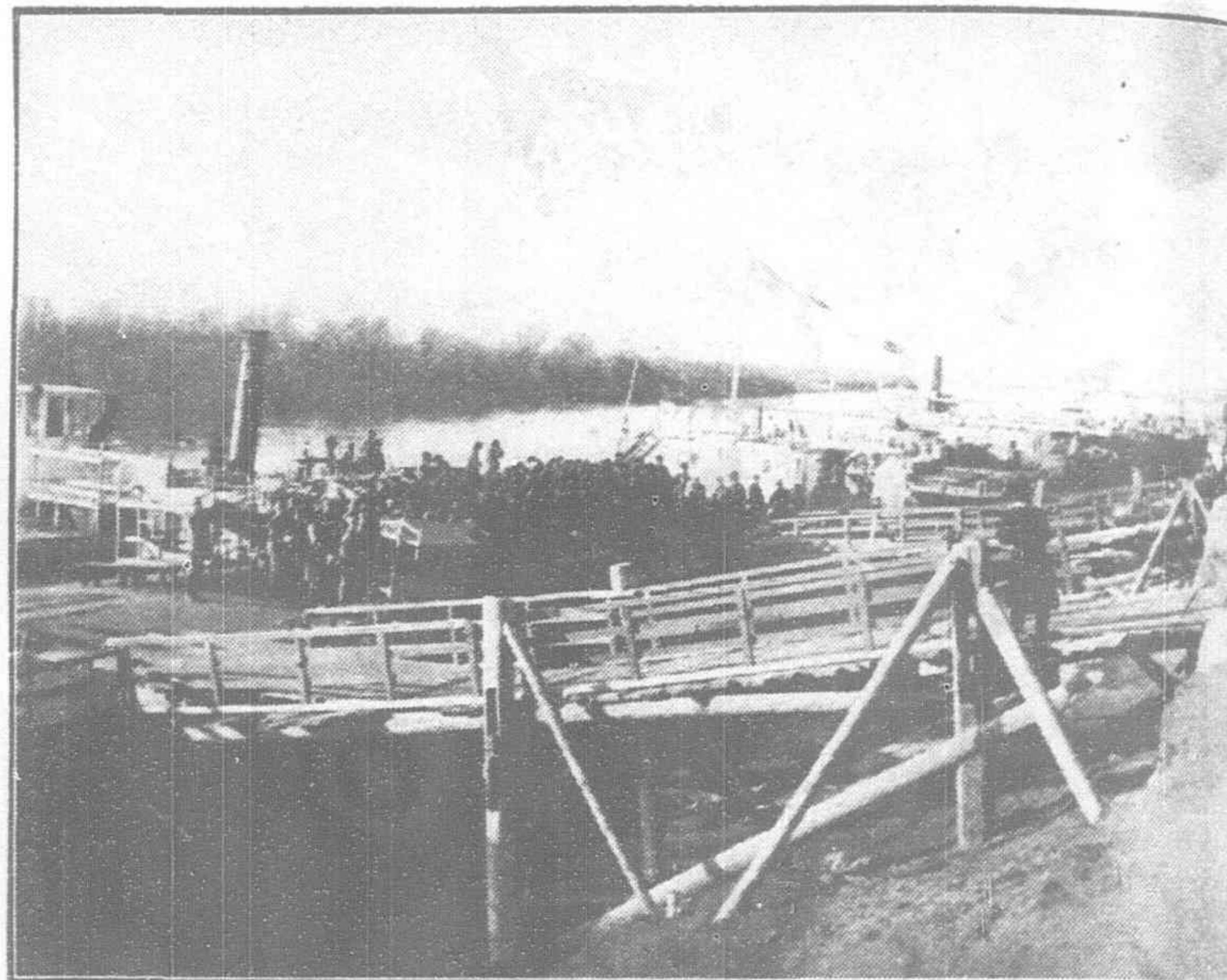
The Bolshevik propaganda at last produced results and the men in the mine refused to work unless they could sell the coal themselves. A coal field, estimated to be able to supply the machinery at the mines, the mills, the steamboats, the smelters, and the railroad of the company, as well as the towns in the vicinity for some four hundred years, did not produce enough in the winter to keep the people's houses warm. It became necessary to break down and burn the wood of the fences and sheds about the houses. What coal was got out was that most easily dug and contained as much as



KIRGHESE MOSQUE AT PAVLODAR



THE KIRGHESE IN WINTER DRESS



AUSTRIAN PRISONERS AT THE PAVLODAR LANDING ON THE IRTYSH

63 per cent of ash, and looked like clay mixed with coal dust. The miners ultimately declined to work unless they could sell the coal to the smelters and secure the profit. They claimed they got nothing from the zinc while coal was worth ready money in the town. To make matters worse potable water gave out. Snow was melted for cooking purposes and no hot bath was had by any one after Christmas.

The difficulties of operating the works were not all confined to the smelter and mines. In the laboratory it was necessary to manufacture some of the chemicals needed in the work. Cattle and sheep bones had to be gathered for bone ash for making cupels. Potassium ferrocyanide was made from potassium cyanide, iron filings, and water. The residues from zinc assays were evaporated to dryness, mixed with lime and water, and the ammonia distilled off. This was caught in distilled water. Crucibles and muffles were made from the same kind of clay as was used in making retorts for the zinc smelter. The muffles were not a success and the crucibles were good only for two or three fusions, and many of them were not good for one. Nine months and a half were needed to get supplies from England and then they did not always come.

When the water gave out an attempt was made to bring ice in tank cars from the Irtysh River, eighty miles away, to keep the boilers going, but was proved unsuccessful.

On January 20 a blizzard started, which lasted nineteen days. Horses and men could not live in it. The temperature dropped from 20 to 40 degrees below zero, Fahrenheit, and the wind blew a gale day and night. The smelter and railroad absolutely closed down, and all work completely stopped. When the storm was over it was found necessary to make extensive repairs to the smelter, and the railroad took a long time to refit for operation. The snow had drifted completely over trains standing on the open track, as well as over houses. It was possible to walk on to the roof of a house over the snow banked on one side while on the other side the ground was bare. The house of the English family was so located that a drift formed in front of it as high as the roof, and each morning the family had to be dug out.

The Bolsheviks arrived in Ekibastus late in February. They promised the workmen half a million rubles to help them if they would nationalize the plant. At a meeting a vote to nationalize was defeated by 75 per cent but this did not deter the 25 per cent from taking over the property, mines, smelters, steamers, railroad, and all. Their first act on the railroad was to loot the main station at the river of all food, tableware, kitchen utensils, and bedclothes.

The works were taken over on March 3 and activities ceased. The foreign employees could do nothing; the workmen could not see the force of further labor; there was no money to induce them to overthrow the influence of the Bolshevik agitators; and on March 10 Mr. and Mrs. Hallett decided to leave, violent trouble threatening between factions, which were rapidly forming.



AUSTRIAN PRISONERS IN FOREGROUND AND WINDMILLS FOR GRINDING GRAIN IN THE BACKGROUND

The first part of their journey into civilization was on a small box car packed full of Kirghese workmen. The next day they took a sledge to cover the three hundred miles to Omsk. Relays of horses were made every twenty or thirty miles, and the whole distance was covered, mostly at a gallop, in three days, the passengers lying down in the sled on straw, and covered with skins and all available clothes to keep out the cold. The sledge sped over the vast snow fields from early morning till almost midnight, the impression at night being that of a great white cloth covered by an inverted spangled bowl. The unbroken horizon was visible on all sides, and the unflecked starry sky closed down to the rim of the earth.

The progress of the Bolsheviks through Siberia has been marked by ruin and disorder. In the Ural Mountains they took over a number of mining properties operated by foreigners and these closed down almost at once. This happened at Kyshtim and Spassky. At Bogoslovsky there were eight blast furnaces in operation. When the Bolsheviks came four of them froze for lack of proper attention. While a meeting was being held to decide what was to be done with these four, three more froze, leaving only one in operation.

The same thing has started in Ekibastus and not only will this plant suffer from the Bolsheviks but other mines and properties in Siberia may expect the same fate. Among the principal foreign-owned properties are the Tanalyk Corporation in the Urals, the French Kamsky Company, Forwood Brothers (English), Panassie (French), Caucasus Copper Company (British-American), the Allah Kerdi Mine (French), the Lena Gold Fields (English), the Russian Gold Mining Company, the Nerchinsk Gold Company, Ltd., the Kolchan Placer, the Onon Placer, and many others.

At one of the stations between Pavodar and Omsk was a Cossack who had recently returned from the Turkish front. He said that the Cossack soldiers there asked only for their bread and tea and half a pound of meat per day. This was refused them by the Bolsheviks and as a result they had to return home.



A SKETCH MAP SHOWING MINING AREAS IN SIBERIA

From the Engineering and Mining Journal

When Omsk was reached it was found that the hotels were full and it was only with great difficulty that a small and dirty room was secured; as usual there was no bedding, no water, no towels, and no soap. The furniture consisted of a wooden table, two chairs, and a rickety iron bed with a straw mattress. In spite of its drawbacks the people were willing to pay the fifteen rubles a day asked for it. This was a room in the best hotel in a city of two hundred thousand people.

Upon inquiry as to railroad accommodations it was found that a party was being made up to go to Vladivostok; a delay of two weeks was made necessary by the difficulty in securing a special car. The railroads of Siberia are run absolutely without a train schedule and to make certain of holding our car and of being attached to the right train it was necessary to go on board at eight o'clock one night thinking that the train would leave during the night some time. The Post train to which the car was to be attached refused to take it and it was obliged to wait until three o'clock the following afternoon for a peasant train from Russia. When this train arrived the car was attached to it and departed for Vladivostok.

The party was made up of seventeen persons, and the nationalities represented were French, Russian, American, English, Danish, and Finnish. It happened that the Omsk section of the railroads was short of money so this section raised the price of passenger fares about 80 per cent without consulting the other parts of the railroad.

The peasants with which the train was filled were being taken into Siberia to be distributed among the different towns where food was more plentiful than in Russia. This train was made up of ordinary box cars and the people were herded into them and lived like animals. The only furniture was a few planks placed crosswise for seats and one small stove to each car. The weather was very cold and these people were forced to live in these cars for a month and sometimes longer. These cars were kept closed most of the time and the only ventilation was through a small window at each end.

From Omsk to Irkutsk the railroad runs through the Steppe. This district is fertile and there are many farms and grainfields to be seen. Also there are many herds of cattle and flocks of sheep. Much of this country is covered with forest but the trees are small and not very good for lumber. Most of the wood cut here is used for firewood. The best lumber comes from farther to the North.

A few low hills are seen as the train approaches Irkutsk and from Irkutsk, around Lake Baikal, to Chita the country is very mountainous. Here there are many tunnels along the road especially along the border of the lake. This lake is forty miles wide in its narrowest part. During the Russo-Japanese War, before the railroad was completed around the lake, supplies were transported on the ice from one side to the other.

At Chita it was found that it was impossible to proceed to Vladivostok via Harbin so the car was changed to the Post train and proceeded over the Amur route which runs to the north around Manchuria. This line was built to develop eastern Siberia and to provide a railroad to Vladivostok entirely within Russian territory. It was opened for travel only two or three years ago. The country through which it runs is hilly for the most part, but not mountainous. The railroad runs nearly parallel to the Amur river for most of the way from Chita to Harbarovsk. At Harbarovsk it crosses the Amur river over the longest bridge in the world. It is a magnificent example of the bridge-builders' art with its massive stone piers and great steel beams and girders.

The new and clean stations and small towns along the railroad are in marked contrast to those in other parts of Siberia. The orderly arrangement of the houses and the broad, even streets give promise of rapid growth in the future. Most of the country visible from the train is not cultivated and has the appearance of being swampy. Experience has shown that the soil is not very good for farming.

The land is covered with a heavy growth of undersized timber which is no good for lumber. More than half of it has been

burned over and many fires and much smoke were observed from the train. These fires were started by sparks from the locomotives and more fires were continually being started as the train passed along. The engineers burn wood for most of the trip and many sparks and burning cinders are blown out into the grass near the track. At times it was necessary for the train barely to creep along as nothing could be seen of the track ahead on account of the smoke, and all the car windows were kept closed.

The road is single-tracked and is the ordinary wide Russian gauge. The roadbed and track is very good but the cars and engines are hopelessly behind the times. The grade of the railroad is very even and there are a few tunnels and many small bridges. It almost seemed to be the custom for the engines to run backward even on the main line. A number of times the train ran for several hours with the engines reversed, and one time when two engines were needed both of them were running backward. This was due to the lack of facilities for making up the trains.

Many Austrian prisoners were seen at different camps along the road. They all seemed to be cheerful and contented and the general opinion was that they would all rather stay where they were than return to the war. On this line are located the stations from which convicts are started on their long journeys to the salt mines and penal settlements in the north.

In the Amur province all the branches of the Amur river carry gold. There are many very rich places along this river among which are the Djilinda on the Zeya Basin, the Amur Gold Mining Company on the Kharga, the Leonovsky Placer and the Kolehon Placer. Under normal conditions this section is capable of producing several million dollars a year and all this is in danger of being taken by the Bolsheviks.

The Amur Gold Mining Company erected a five-foot dredge on the Kharga, a tributary of the Zeya; the gravel carries G.\$0.75 per cubic yard and in 1914 the production was about \$120,000. For the Ochotsk Gold Mining Company in the 1914 season one 7½-foot and one 3½-foot dredge (a stacker now converted into a dredge) produced about G. \$307,400 from 928,100 cubic yards at a reported working cost of ten cents, and a total cost of twenty-eight cents per yard. In 1915 the two dredges washed 784,552 cubic yards, which yielded G. \$399,225.

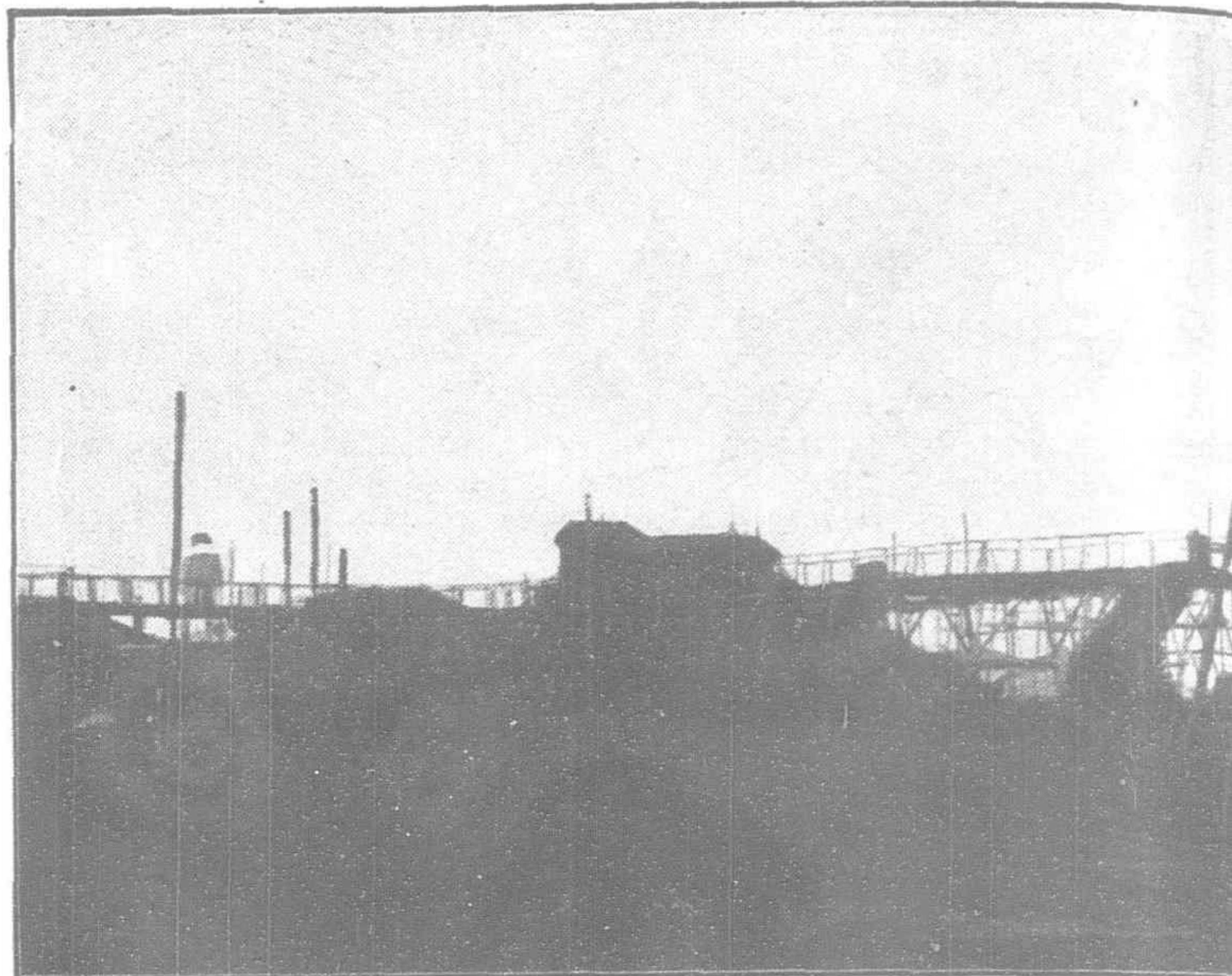
The trip from Omsk to Vladivostok was made in fourteen days. Meals were served at all the larger stations but the big crowds and the uncertainty of the time of the arrival and departure of the trains made it necessary to prepare and eat most of the meals in the car. The food was bought from peasant women at the stations along the road and hot water for making tea was provided free of charge at all stations.

Most of the daylight hours were spent in reading, preparing the meals, playing cards, and walking about at the different stations when the train stopped. At night a guard was kept by two of the men to prevent the Red Guards and taranihes from entering the car. One night a Chinese, who was carrying forty thousand rubles, was allowed to sleep in the car to keep from being robbed. He was going to a certain town to buy goods and was afraid to trust himself in the train. The car was examined several times along the road by the railroad officials but there was no trouble at any time.

Great difficulty was experienced in Vladivostok in securing rooms and the first night was spent in a garret with some Chinese. The next day a better room was found with the usual poor furnishing. We were lucky to get this as many people were living in fourth-class wagons in the railroad yards until they could get a steamer. Five days were required to secure the necessary papers for leaving Siberia and there was a great sigh of relief when the steamer Simbersk was boarded for Japan.

Japanese Bond Issues

The Department of Agriculture and Commerce of the Japanese Government, in connection with the bond issue of Yen 50,000,000, made an announcement on May 11 of the policy of the Japanese Government as to future bond issues.



ANOTHER VIEW OF THE EKIBASTUS MINE



TYPICAL SIBERIAN HOUSE

The first class of bonds will be Yen 30,000,000 of extraordinary war credits, which may be issued in order to secure a fund for prosecuting the war. They need not be issued at once. The second class will be those of Yen 300,000,000 of special treasury certificates, which may be employed for adjusting trade accounts for the export of Japanese goods, for furnishing money to manufacturers in Japan, in order to relieve them from the pressure of lack of money, as they sold goods on trust to Allies in the war, and also to make smooth the payments for labor and raw materials bought. These certificates may be issued a little at a time and not all at once.

The third class of bonds are those of Yen 50,000,000 of treasury bonds for various Government undertakings. Yen 27,000,000 of the funds thus raised is to be employed for the construction and repair of railways. Yen 10,000,000 is to be used for the expenses of increasing telephones. About Yen 13,000,000 is to be used for improvement of facilities for transportation and communications in Kobe.

The bond issue, which was just announced, belongs to the third class. The price of issue will be Yen 95.25; interest at the rate of five per cent; term of repayment June 1, 1923. The subscriptions were received between May 20 to 22.

The Japanese Government, by the recent bond issue, aims not only to obtain funds for carrying out the Government enterprises involved, but also to readjust the supply of money, thereby regulating the prices of commodities.

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China's Landed Wealth

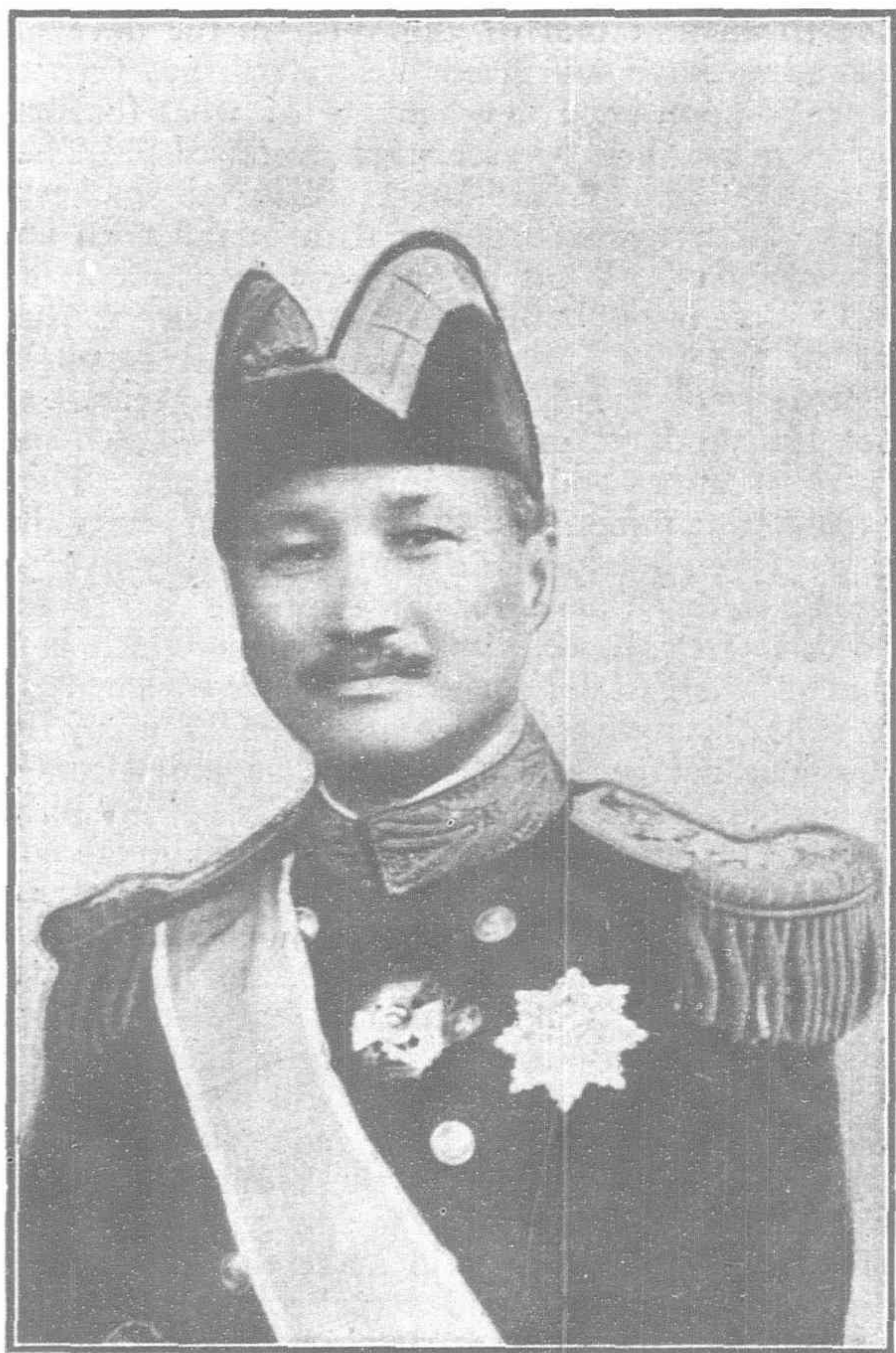
The Chinese have always had a profound respect for the farmer and a keen appreciation of the fact that both their economic and their political ascendancy over their less cultured neighbours were founded upon the skill, ingenuity and tireless industry of their husbandmen. So convinced have they been that all wealth comes out of the soil that for many centuries the merchant and trader were held in the greatest contempt, despite the obvious fact that through all ages the Chinese have been passionately fond of trading and bartering and cannot be restrained from experimenting with commercial ventures in a covert way even when they hold the highest official positions and profess the greatest distaste for commerce. The mythical figure who appears in Chinese tradition as the First Husbandman was, until the abdication of the Manchus, a deity to whom the Emperor himself

had annually to pay the tribute of emulation by ploughing a plot of ground in the capital, and in ancient Chinese literature the farmer seldom if ever occupies a place corresponding to that of the serfs and peasants and yokels of our own mediæval literature. In spite of all this appreciation the Chinese have shown very little tendency in the last twenty centuries to improve upon the farming methods and implements of the ancients or to meet the demand upon the soil, created by a vastly increased population, by developing a science of farming. As long as there was plenty of land for every one in the Occident our farmer forefathers were content to plough and sow and reap with much the same indifference to new things that the Chinese still display in their agriculture, but as soon as it became apparent that the same amount of land had to feed twice as many people and at the same time meet the requirements for raw materials of a thousand new industries, chemistry, botany, geology, forestry, engineering and mechanics were pressed into service and we created a science of farming. Now the Chinese were much more sorely in need of improvement along these lines a thousand years ago than any Occidental country would be to-day if we were still the primitive scrapers of the soil that we were a few generations back, but their ingenuity and inventiveness in farming, as in so many of their arts and crafts, seems to have ceased working before the European peoples had emerged from savagery and instead of keeping abreast of their needs they have lessened the productiveness of vast areas by deforestation and the consequent development of an erratic and sometimes destructive system of water supply.

The Chinese seem to have pledged themselves during the last decade to an imitation of the West in the development of industries and to have convinced themselves that their economic future depends upon such development of what foreigners have persuaded them are their "vast natural resources." The average official is therefore much more interested in tall smokestacks and in expanses of corrugated roofing than in tall corn and broad fields of vegetables. What has to be very pointedly impressed upon the Chinese mind, both official and popular, is that in the future as in the past China's "vast natural resources" will probably prove to be largely vegetable, that her greatest industries will utilize the products of fields and forests much more than the products of mines and other mineral deposits. The deposits of many metals and minerals in China have been pretty thoroughly surveyed by foreign experts in the past twenty-five years and it is beginning to dawn upon foreign engineers that these deposits are not so vast after all. In the case of iron, which is the backbone of a great group of industries which have enriched Occidental countries, it has been discovered to the pain of many that China is probably not nearly so rich as was supposed and that her future in iron and steel production is really not promising. We know enough of Chinese soil, vegetation and climate however to assure the Chinese people that as great a system of industries, and as profitable a system can be built upon the vegetable products of Chinese soil as other nations have built upon the products of their mines, and it is along this line that the development of industry in this country should be encouraged. The Chinese need all the food they produce and will soon need more than they produce. If they are to have industries dependent upon the products of the soil, a part of the land now devoted to food production will have to be devoted to supplying raw materials for these industries, and nothing will make this possible but a revolution in farming methods and a real concentration of popular interest upon such matters as forestry, irrigation, and land reclamation. The Chinese must go "back to the land," not for their health, nor for sentimental reasons, but to lay a foundation for their industrial future.

Just because Great Britain, America and other wealthy Western nations happen to have built up industrial wealth through industries largely dependent upon mineral products, there is no reason why China should feel bound to develop similar industries or stagnate. If China can produce more and better and cheaper vegetable products than the Occident she can buy iron just as the Occident buys her wood oil, tea and silk. If however she concentrates upon the industrial development of her iron as America and Great Britain have done she will exhaust the supply in a few generations and will have a vast

system of industries on her hands which she cannot supply with raw material. If the iron and steel mills of the Great Lake district of America were transplanted to China the country would be worked out in ten years. China's industrial future does not lie that way and it is time that it were realized. The Chinese Government which will turn its attention to doubling the vegetable oil output without reducing the food supply will be doing considerably more for the China of the future than a Government which founds steel mills. A phosphate factory will meet China's future needs much better than a nail factory, and systematic afforestation and conservancy will be much more appreciated twenty-five years from now than the development of a Chinese Pittsburgh for the forging of steel rails. The Chinese, and most foreigners who live among them, have been so thoroughly obsessed by their conception of "China's vast natural resources," and, with an eye upon the industrial development of America, have so persistently refused to think of anything but minerals when they thought of iron, that they have no appreciation of China's real needs and are unprepared to adjust their schemes for China's future to a development founded upon Chinese vegetation; but a brief consideration of any survey of the country's mineral deposits, and of the relation of the deposits to the area and population of China will demonstrate that China's reliance must be put in the soil and that her permanent prosperity is dependent upon the farmer and the manufacturer whose raw materials are grown on the land.



ADMIRAL TSAI TING-KAN, NEWLY APPOINTED CHAIRMAN OF THE
TARIFF REVISION COMMISSION

Mr. Tseng Shu-chi, whose photograph appears upon the cover of this issue, announces, as we are going to press, his resignation from the office of Chairman of the Tariff Revision Commission; and the appointment to that office of Admiral Tsai Ting-kan, one of the best known and most popular English-speaking Chinese in China, is gazetted. Admiral Tsai was, until his recent departure from Peking, master of ceremonies in the President's Palace and Assistant Director of the Customs Administration. He is a native of Kuangtung Province and was among the first Chinese students educated in America.

The Recent Sino-Japanese Agreement

There are only three classes of people in China capable of following public events and of passing opinions upon them. They are the officials, the students, and the merchants. An expression of official opinion is always open to the suspicion that it is inspired by political motives. A demonstration by the students always has to be discounted somewhat because Chinese students, like all others, are impulsive, quixotic, and radical. The opinions of the merchants come the nearest to being expressions of cautious, well balanced, and sane public opinion.

The military agreement signed by Chinese and Japanese delegates in Peking, May 16, has elicited a great deal of unfavorable comment from officials in the South and no little querying from the Northern militarists who have not been admitted to the secret; it has fired the students of the capital to a high pitch of excitement; but what is most significant it has been the subject of the bitterest comment from the United Chambers of Commerce, now in session in Tientsin, which represent every province, dependency, and administrative area in China and which are certainly more representative of the Chinese people and their interests than any parliament which China has ever summoned.

The actual literal text of the understanding which was signed in Peking has not yet been published—not in full at any rate—but there is no such thing as a secret understanding in China when more than two people are parties to the understanding, and the fact that the merchant representatives, in their conclave, depart from their usual decorous and conservative indifference to political matters to bring charges against the Peking Government and to strengthen their demand for the publication of the terms of the agreement with threats, is generally taken as a fairly good indication that the published reports of the agreement, which purport to be paraphrases, follow the actual text pretty closely and that the merchants know it. Every official in Peking has been separately visited by representatives of the large body of protesting students who returned from Japan, by the representatives of local student bodies and by representatives of the United Chambers of Commerce, and has been urged to divulge the text of the agreement if he possessed it or to bring pressure to bear upon the Cabinet and the military leaders and force them to publish the terms of an agreement which is reported to be damaging to China's independence and which is given a doubly sinister purport in the eyes of the Chinese people by the secrecy which surrounds it. The President has been exhorted by numerous organizations to insist upon publication in the first place and to refuse to affix his seal to the document in the second place. More than fifty telegrams from high provincial officials, inquiring into the nature of the agreement or protesting against its signature have been received by the Government. Yet the document was signed on the 16th of last month and no authorized version of the text has yet been made public.

The Government assures the people and all urgent inquirers from the protesting organizations, that the understanding is nothing more than a plan for military coöperation with Japan on the Sino-Siberian border, that it does not become effective until enemy activities in that quarter make defensive measures necessary and that it ceases to be operative as soon as the menace of possible activities is removed. This explanation has apparently been accepted by the Allies. Washington telegraphs that it is satisfied with the explanation and does not believe that any step has been taken which directly concerns the United States. France goes further and congratulates the parties to the agreement upon their active interest in the Allied cause.

The Peking and Shanghai papers, both Chinese and foreign, have published twelve clauses of what purports to be a close paraphrase of the text of the agreement, made public by a Chinese member of the military delegation, which had authority to discuss the terms of the agreement, who was dissatisfied with the final draft and decided to put it before the people to justify himself. There is no other authority for either the text or the source of the text than these assurances given in the Chinese press.

The Alleged Paraphrase

Article 1. In view of the penetration of enemy influence into the eastern territory of Russia, and of the likelihood of the peace of the two contracting parties being disturbed thereby, China and Japan mutually agree actively to undertake the obligations of war participation by measures designed jointly to guard against the action of the enemy.

Art. 2. The two countries shall mutually recognize and respect the equality of the other regarding position and interests in carrying out joint military measures.

Art. 3. When it is necessary to take action based on this agreement, orders will be issued by both China and Japan to their troops and people, calling on them to be frankly sincere in dealing with each other in the area of military operations; and the Chinese officials shall coöperate and assist the Japanese troops in the area involved so that there may be no hindrance to military movements. Japanese troops shall on their part respect Chinese sovereignty and shall not cause any inconvenience to the Chinese people by violating local customs and traditions.

Art. 4. Japanese troops in Chinese territory shall withdraw from China as soon as war is ended.

Art. 5. If it be found necessary to send troops outside of Chinese territory, troops will be jointly sent by the two countries.

Art. 6. The war area and war responsibilities shall be fixed by mutual arrangement of the military authorities of the two countries as and when occasion arises in accordance with their respective military resources.

Art. 7. In the interests of convenience, the military authorities of the two countries shall undertake the following affairs during the period necessary for the execution of joint measures:

1. The two countries shall mutually assist and facilitate each other in extending the means of communications (post and telegraph) in connection with military movements and transportation.
2. When necessary for war purposes construction operations may be carried on and the same shall be decided, when occasion arises, by mutual consent of the chief commanders of the two countries. The said construction operations shall be removed when the war is ended.
3. The two countries shall mutually supply each other with military supplies and raw materials for the purpose of jointly guarding against the enemy. The quantity to be supplied shall be limited to the extent of not interfering with the necessary requirements of the country supplying the same.
4. Regarding questions of military sanitation in the war area the two countries shall render mutual assistance to each other.
5. Officers directly concerned with war operations shall mutually be sent by the two countries for coöperation. If one party should ask for the assistance of technical experts, the other shall supply the same.
6. For convenience, military maps of the area of war operations will be exchanged.

Art. 8. When the Chinese Eastern Railway is used for military transportation, the provisions of the original treaty relating to the management and protection of the said line shall be respected. The method of transportation shall be decided as occasion arises.

Art. 9. Details regarding the actual performance of this agreement shall be discussed by mutual agreement of the delegates appointed by the Military Authorities of the two countries concerned.

Art. 10. Neither of the two countries shall disclose the contents of the agreement and its appendix, and the same shall be treated as military secrets.

Art. 11. This Agreement shall become valid when it is approved by both Governments after being signed by the Military representatives of the two countries. As to the proper moment for the beginning of war operations, the same shall be decided by the highest military organs of the two countries. The provisions of this agreement and the detailed steps arising therefrom shall become null and void on the day the joint war measures against the enemy end.

Art. 12. Two copies of the Chinese and of the Japanese text of this agreement shall be drawn, one of each shall be kept by China and Japan. The Chinese and Japanese texts shall be identical in meaning.

This alleged text has been supplemented by a report in the *Kung Yen Pao*, a strong supporter of the military faction in Peking which entered into and concluded the agreement, by the following statement:

At the instance of the Government the following three articles have been inserted into the agreement:

- (1) The present Agreement shall cease to operate when the conditions of affairs in Eastern Siberia and North Manchuria are such that there is no necessity for China and Japan to dispatch a joint military expedition.
- (2) The Agreement shall be rendered null and void as soon as the present war in Europe comes to an end.
- (3) The area within which the joint military expedition of both countries concerned shall be dispatched shall be limited to the Northeastern frontiers of China. By Northeastern frontiers of China are meant Eastern Siberia and North Manchuria only.

Next in this alleged text in interest is the series of telegrams dispatched by the United Chambers of Commerce to the high officials of Peking, the foreign Legations in Peking, the press, the provincial governments, and the Cantonese guilds. The *Shanghai Gazette*, a publication which opposes the present militarist Government in Peking as strongly as the *Kung Yen Pao* supports it, is responsible for the following translations:

To the President, Premier, and Various Ministers

"It is hoped that our previous telegram has received your attention. In spite of the cries and appeals of the merchants, the Military Commission has recklessly and secretly signed the new Chino-Japanese treaty. What is the cause of the close friendship between Japan and these military delegates that they insist on sacrificing China? So long as a spark of life remains in our body, we swear that we will not recognize such a treaty. We pray that the President will have pity on a people that have seen 5,000 years of civilization and resist the terms imposed on China by refusing to use his seal. We also pray that the text of the pact be published for the scrutiny of the people in order that their views may be expressed regarding the same. Whatever little hope now remaining to this country is hanging by one single thread in the hands of the President. We, the citizens of the Republic, are unwilling to become slaves. May the President have pity on us. Signed: The Entire Body of the United Chambers of Commerce, including representatives of the 24 Provincial Commercial Areas."

To the Foreign Legations

"According to newspaper reports the new Chino-Japanese pact was secretly signed on the 16th inst. A perusal of Article 2 of the Provisional Constitution of the Republic shows that the sovereign rights of the Republic of China are vested in the people. Since our Parliament is not now in existence, no treaty can be signed, and any treaty now signed is concluded without the consent of the people. It is impossible for us to recognize such a treaty. Signed: United Chambers of Commerce."

To the Shanghai Newspapers: and to Be Forwarded to the Military and Civil Governors, Provincial Assemblies, Etc., of the Provinces

"The new Chino-Japanese pact has been secretly signed by the Commissions at Peking. Twice have we wired and once sent a delegation to interview the President urging him to resist the sealing of the same. We have also declared to the Foreign Legations in Peking that under no circumstance will we recognize the said agreement. We appeal to you to help us to devise means to save the situation and to prevent the country from falling into the hands of a foreign country."

To the Canton Guild of Shanghai; to Be Forwarded to the 36 Cantonese Bodies

"Regarding the new Chino-Japanese pact, which was signed on the 16th inst., we have twice appealed to the President by wire and once by delegation to urge him not to use his seal. We have also made statement to the Foreign Legations stating that under no circumstance will we recognize the newly signed pact."

These messages, which depart from the stilted and formal style of Chinese correspondence and show unmistakable signs of intense feeling, tend to make foreigners much more suspicious of the nature of the agreement than the protests of students or the clamor set up by disgruntled politicians. The merchants must have some good reason for protesting in such vigorous terms, they must have reason to suspect that the full text of the military agreement contains provisions which actually endanger China's national independence. It is impossible of course to pass judgment upon the published text which has appeared in Chinese papers and which we have reproduced above. It does not pretend to be either full or accurate and a judgment based upon it might be very far from just. Interpretations and judgments have been published, however, and the Chinese critics agree upon finding a particularly malicious Japanese purpose in Article 5. This provides that if it becomes necessary to send troops outside of China they will be dispatched jointly by both China and Japan. Chinese commentators say that the purpose of this is to make it impossible for China to send an expeditionary force to Russia, to Europe, or to any other part of the world to which such troops might be sent, without Japan's coöperation or permission. If Japan does not see fit to give material assistance to the Allies she will be in a position to prevent China from winning credit and prestige and a consequent claim upon the support of Europe and America at the eventual peace conference,

at which it might be anticipated that certain liberties which Japan has taken in China during the period of the war will come up for discussion. The second clause in Article 11 is subject to the same criticism, since it provides that the highest military authorities shall decide when the moment for coöperative military action has arrived. Since the signing of the agreement it has been announced in Peking that owing to internal troubles the proposed expeditionary force for France will not be organized and this is seized upon by the Chinese press as confirmation of their suspicions of the purpose of Article 5. The press also takes pains to point out that China came into the war at the invitation of Great Britain and America and that the insertion of a clause in the recent agreement which is intended to render China's declaration of war ineffective and of no advantage to either China or the Allies is a retaliation upon the meddling Occidentals who moved China to action against Japan's wishes.

The Japanese and Chinese Governments issued a concurrent statement in Tokyo and Peking, May 30, stating the purpose of the agreement and giving publicity to the original exchange of notes between the Chinese Minister in Tokyo and the Japanese Ministry of Foreign Affairs, March 25. The agreement was also formally ratified by the two Governments, May 30.

The Reuter Agency report of the publication of the notes in Tokyo emphatically denies—with what authority is not apparent—that the agreement contains any clauses which stipulate that Japan is to have control of the Chinese army and navy, of the police, of arsenals and fortifications, of railways and mines, and of China's finances, all of which have figured in the rumors and surmises which have been in circulation in China since the agreement began to be discussed.

As we have already said it is rather futile speculating upon the purport and character of a text which is not authoritative, although it is admittedly near the real text and to that extent part of it, and in the eyes of foreigners the suspicious features are not in the text but in the fact that there is any agreement at all and that, when one is consummated, it is surrounded by so much mystery and obstinate secrecy. The signing of the understanding was preceded by the ominous reports of its character. It was said to surrender to Japan complete control of railways, telegraphs, finances, mines, and arsenals, and to provide for Japanese supervision of the army, the navy, the police, and the collection of the land tax. This is a large order. While there are imperialists in Japan who would undoubtedly consider such a complete subordination of China as no more than Japan's due and while there are opportunist officials in China who would probably affix their signatures to a document making all these concessions if their commission on loans were sufficiently large, it is impossible to believe that the Japanese Government, which is in a sense on its honor in this part of the world while that part of the Occident which has frequently guaranteed China's sovereign rights is absorbed in the European struggle, could possibly conceive of taking such an advantage of China while governed by an irresponsible group of military leaders or that any group of Chinese, however small could agree to make such concessions in the name of their countrymen. As it is, Japan has a great deal to account for and a great deal to explain. Her publicists have been exceedingly busy for several years condemning the notorious Twenty-one Demands and the undiplomatic ministry which presented them and misrepresented their character while presenting them. America was not then in the war and America had no army worth mentioning, yet Japan felt the weight of foreign disapproval. It seems very unlikely that Japan would again place herself in such an embarrassing position and act in direct opposition to the wishes and interests of the Allies which have built up an enormous naval and military organization and have cultivated so great a passion for international fair play. In speculating upon what the recent agreement provides one must therefore give Japan credit for ordinary sanity as well as for her much advertised desire to turn China into a subordinate supply base and source of man power. The prospects for Japan's post bellum future are not so good that her entire Government would be driven mad by opportunism. Indeed there has been every indication during the past year that the Japanese Government has concluded that the national appetite must be governed by policy and decorum. The Japanese them-

selves do not give Japan credit for altruism, but we must all give them credit for some political judgment based upon experience.

The fact that both Japan and China publicly and officially deny that the agreement contains any provisions which undermine China's independence and sovereignty, of course carries no particular weight. If the so-called Chinese Government had negotiated a treaty with Japan surrendering all the nation's sovereign rights to Japan they would not dare to admit it, and if it suited Japanese policy to misrepresent the terms, critics feel that it would be quite in keeping with Japan's precedent to misrepresent them. Flat denial is not a crime in the East; it is a legitimate diplomatic weapon and must always be taken into account. Coincidental with the signing of the agreement, the Japanese Kokusai Agency, which is an official organ, denied that Japan had ever contemplated taking over the Sungari-Changchun section of the Chinese Eastern Railway from the Russians, while the following day Reuter's correspondent in Peking wired that the deal was not only consummated but announced to the Chinese Government. Granting, however, that neither Chinese nor Japanese official "assurances" have any particular value except as material for an interesting study of Oriental political ethics, one must take into account the fact that neither China nor Japan are one politically and that the political hides of neither Government would be safe in their respective countries if the recent agreement contained one half the provisions which Chinese publicists have anticipated, which fact the politicians of both countries are certainly astute enough to recognize. Another matter which would do more than anything else to deter Japan from forcing a distasteful agreement upon Peking's officials or from purchasing their signatures to really big concessions is the ever present possibility of Chinese resentment taking the form of a boycott. Japan's markets in some other quarters of the world have been cut off and her economic life is very largely dependent upon her trade with China. A thorough-going boycott like that which was sustained for a year after the presentation of the Twenty-one Demands would be much too costly to risk.

The Most Likely Explanation

The foregoing paragraphs are arguments against the probability of the military agreement containing anything like the terms which the Chinese would have us believe the document or its still more secret appendices, do contain. One cannot argue, however, that the agreement is likely to have been signed in China's interest or to accept it as a welcome evidence of Oriental interest in the Allied cause as Washington has done with some reserve and as Paris has done wholeheartedly. Where there is smoke there is fire. The clamor raised by the conservative commercial folk and by the students must be occasioned by something more than a wave of emotionalism. The loans which the Peking Government has negotiated with Japanese concerns by the sacrifice of Government properties and other valuable concessions, which no parliament, however inept, would sanction, are evidence of the calloused determination of the Peking functionaries to further their political ends at any cost. The necessity for coöperative action in the territories adjacent to Russia is by no means apparent, especially since American, British and Japanese investigators have reported that enemy influence and military organization among war prisoners in Siberia are not menaces at all but were largely the creation of excitable Japanese jingo publicists. If China had had the slightest interest in protecting her frontiers against possible Bolshevik or German intrusions she would have had an army on the Siberian border four months ago. If Japan had the slightest intention of repelling a possible Russian or enemy intrusion into Manchuria she, with her traditional self-sufficiency and her confidence in the conscript army which pushed the Imperial Russian army out of Liaotung twelve years ago, would not want to be hampered or compromised by a rag-tag Chinese force in a campaign against irregular forces of Bolsheviks and Austrian deserters, nor would she be at all ready to share with China any credit which might be won from such a campaign when the whole burden of equipment, finance and fighting would be certain to fall upon her. The announced purpose of the agreement is therefore regarded as too evidently a cover for some ulterior purpose to be even considered by anyone

familiar with the Orient. The recent statement of a Japanese official in Peking to the effect that Japan was not forcing anything on China, but that the Chinese had made the first approaches and suggestions leading to the agreement is very likely to be the truth. Although it is nearly all guesswork, since there is so little tangible documentary evidence to pronounce upon, one cannot escape the conclusion that the Peking Government in its war upon South and Southwest China has found itself in need of further Japanese support than it could procure from private Japanese concerns and that it has arranged for some sort of support in this agreement. Probably the support is to be financial. Whatever it is something has certainly been conceded in return and it is just as likely as not, since so much mystery is made of it, that the concession is something which the Chinese people as a body would not approve and which the military leaders have no constitutional right to cede. Until the actual clauses of the whole document are finally published it is impossible to pass further judgment than this upon it.

The Philosophical Attitude

The most interesting feature of the whole situation to the Occidental is the intense interest which the Chinese are taking in it. Foreign residents in China sustain their optimism and their faith in China's future when the Chinese people show an interest in public events and when some Chinese faction or individual actually abandons prolix discussion and shows an inclination to do something, whether right or wrong. It is Chinese apathy to China's rights, wrongs and interests which drives the sympathetic foreigner to despair and forces him to regard the indignities heaped upon China from time to time as a just Nemesis. The stir which the Chinese students who came back from Japan have made in the capital, with the support of the pupils in Metropolitan schools, whether misguided or not, arouses fresh hope of an intelligent Chinese democracy which will control and check a representative Government. Uncalled for as the outrages perpetrated by Northern soldiery in Hunan may be, even this campaign is watched with an interest by foreigners which they could not possibly sustain in the seemingly endless period of conspiracy and interchange of envoys and telegrams which preceded it, since it seems to prove that the various Chinese military factions can be prodded into action, however iniquitous. Then, as we have already pointed out, the determined stand taken by the United Chambers of Commerce is a significant and hopeful sign. It is some evidence that China is actually developing public opinion and nothing could be more welcome to China's well-wishers.

China has no great national stability, but she has great racial stability and whatever small impressions Japan or any other power may make upon the fringes of the territory which is the Chinese racial heritage, or upon the administrative system which purports to be the Government of the Chinese nation, will probably be regarded by future historians as very trifling indeed, China destroys by swallowing and assimilating her assailants, and the nations in the past which have aspired to conquer and rule China as a province have invariably disappeared into the Chinese maw while their home territories became enfeebled and dependent vassal states. China has lost none of this power of absorption and it is a power which Japan will challenge to her cost and the inevitable loss of her identity. In the minds of contemporary Chinese and of most foreigners who are watching the political by-play there seems to be an imminent danger of China becoming attached to Japan as a dependent province, as a field for Japanese expansion. But if one knows Chinese history and the remarkable character of the Chinese people he cannot avoid the conclusion that the apparent menace to China is a much greater menace to the national entity of Japan and that a Chinese subordination to Japan would appear to historians of the future as nothing more than a step in the absorption of the Japanese into the Chinese cosmos—it cannot be described as a nation and it is not a homogeneous race—infusing into it a little fresh vigor perhaps. Such a philosophical attitude is not much consolation to the Chinese who are opposing Japan's expansion in China and it conveys no warning to Japan, but if China does not develop sufficiently along national lines to preserve her national integrity and if the Japanese people persist in their ambition to expand

upon the continent of Asia, the fusion of Japan into China, however remote it may seem, is something which both peoples have to anticipate.

This may not seem to have much to do with the recent agreement, but if this agreement contains material Chinese concessions, as is suspected, and if it goes unchallenged after the temporary fervor of the students and merchants has abated, as is likely enough, it may be assumed that it is only one step in a series of steps towards complete Japanese control in this country. China is not developing a concrete and effective national organization now and, given sufficient hold in the next few years, it will be easy enough for Japan to expand in China to the extent of her ambitions, whatever they may be, in which event one could not hope for the restoration of an independent Chinese state unattached in any way to Japan, but would have to look philosophically into the future when Japan's racial and cultural identity would be merged into the much larger and unadaptable racial and cultural identity of China.

Fair Play for Russia

The Bolshevik movement in Russia is a most exasperating bull in the diplomatic china shop. Whichever way it turns it violates the most sacred canons of the diplomatic cult and seems to make standardized diplomacy of the old order not only futile but foolish. Now the general public, in all countries where straight and frank thinking and talking have been held in esteem, has never had a clear comprehension of or a real sympathy for the sinuosities of diplomacy as it was practised before the present great war and as some of the high priests of the cult in every country would still practise it if they could. So the general public in the Allied countries, while sincerely and bitterly deploring the effect which Russia's withdrawal from the contest has had upon the military situation in Europe, is inclined to smile upon the discomfiture and embarrassment of the accredited diplomatists who have had to deal with the Russian bull, very much as any irreverent crowd finds amusement in the discomfort of a pompous dignitary whose wig and robes are carried away by the wind.

It is very difficult indeed to study the Bolsheviki sympathetically when the whole world realizes that their disaffection and their complete surrender of Russia has released large German armies for the prolongation of the ghastly struggle on the western front. One has to be very much detached from the influence of current events to make the just analytical study of the turbulence in Russia which future generations will make, when its most direct and apparent effect is the increased burden of expense upon the Allied nations at war, the heavy loss upon investments in Russia, and the increased loss of life among the friends and kindred whom we all have at the front. It is, however, the special province of the Anglo-Saxon peoples to be fair, and the attitude of America during the past few months has undoubtedly helped in large measure to put a check upon a wholesale and whole-hearted condemnation of the Russian people and also upon the natural tendency of all Allied peoples to advocate a corrective, if not punitive, campaign against Russia from whatever angle it could best be undertaken. So many sane and unemotional men, who must be credited with a knowledge of the Russians, have come out of the country since Bolshevism got its grip, and have steadfastly expressed the opinion, in the face of the world's resentment and skepticism, that Bolshevism would correct itself, that the mad turmoil would dissipate itself and that good government would come out of what now seems hopeless anarchy, that those of us, who are on the outside and have little to guide us but our injured feelings, are forced, for the sake of fairness, to suspend judgment and to make some attempt to understand what is going forward in Russia.

German influence undoubtedly made every possible use of Bolshevism and cheered it along the course which would lead to surest ruin. But the Germans could not create the movement; they could only play upon the passions of the people whom they found in power and this, it must be confessed, they did with an astuteness which proves that they had a better insight into the tendencies of the Russian revolution than the Allied ministers of state and their representatives in Petrograd. The very simplicity of the Russian proletariat disarmed and nonplused the Allied representatives who had to deal with them. Having untrained minds, the great illiterate horde thought and reasoned and acted as a child would. Any one who has had to do with children knows that the questions which children propound, the logic that they advance, the reasons that they give for their actions, can, by virtue of their simplicity, directness, and pure reasonableness, drive their elders to abandon argument and fall back upon authority. Children know nothing of policy, of tact, of self-deception, of expediency. They know nothing of the artificial standards by which life in artificial modern communities is hedged. As they grow up they learn to conceal their real desires, to believe what reason forbids them to believe as children, and to like what their natural, unperverted taste as children forbids them to like. All this for the sake of greater convenience and peace in dealing with their fellows. The Russian proletariat, as a body, has never grown up. It discovered a want and it set out to satisfy that want. The body of the proletariat had never had any more experience in international intercourse, or the rules governing it, than the child has social intercourse and the etiquette which governs it. The old Russian state was the Czar. When the Czar disappeared and the people found themselves in power, they discovered a want and were as scornful of the conventions and rules governing the intercourse of states as a child is impatient of the household laws in which he can see nothing that is reasonable but much that crosses his purposes. The Russian people knew nothing of self-deception. As a body of once peaceable individuals they had no likes or dislikes among states. They did not like Germany any more than they disliked England; they did not dislike Germany any more than they liked England. They had no experience in dealing with states so they had no preferences, and having no preferences, and being keenly desirous of peace, they could not see why they should fight any one and postpone the attainment of the peace they had set their hearts upon. Treaties and conventions and all the traditions of treaty-making and keeping, with which the democracies that have grown up in experience are so familiar, meant nothing whatever to them.

The arguments and questions of the Bolsheviks sound as strange and childishly simple-minded to us as the American objection to paying taxes which they had no voice in imposing did to many men in the British Government a hundred and forty-five years ago; and these men with their childish outlook upon a world that is corseted with standards and conventions, are as disconcerting and as hard to deal with as the child who asks reasonable but unanswerable questions. The task of explaining to this impatient and peevish Russian child why he should abide by duties and obligations was that set for the Allies, while the Germans had the much easier task of encouraging him in his whims. A mother tells her small boy that he should not climb the back fence. The child thinks that this is an unreasonable and tyrannical injunction. The man on the other side of the fence tells the small boy that he is quite right, that his mother is a tyrant, so the small boy climbs the fence and is kidnapped. Germany had nothing to do but play the part of the kidnapper. It is by such experiences that boys learn to abide by the rules that govern them, and by such experiences as Russia is having her simple people will learn to abide by the uncomfortable conventions that govern nations.

The fact that the squabble in the Russian household inconveniences us all, that it deprives us of the service of Russia does not give us the right to interfere, to break into the family circle and spank the wayward children. We believe that they are gravely in error, but we also believe in the right of nations to grow up and develop themselves along their own lines. As long as the Russians stay within their own bounds, as long as they do not abet our enemies or join our enemies against us, we shall do much better by the Russian people, and be much more certain of

retaining their friendship and regaining their support when they have learned the error of their ways. A study of the Russian people and the right kind of diplomacy among them is much better policy than a punitive invasion of their country. This seems to be the American idea, and after all it seems not only fairer to the Russians, but much more astute as a policy for the Allies than the exercise of violence dictated by a consideration of our interests as belligerents and by a lack of consideration for the Russian people.

Of course it is hard to see it this way when so much is at stake, but if one is to abide consistently by the very high ideals which are voiced in every official pronouncement that comes from London, Washington, and Paris, one has to study even this exasperating and costly Bolshevik movement fair-mindedly.

China and Russia

Whatever the rights of the Allies are in Russia and whatever attitude the Powers may decide to adopt toward Russia in her present state of ebullition there are two peoples that are directly interested in Russian affairs and which have a perfect right to demonstrate that interest. They are the Russian people and the Chinese people. China and Russia in Asia have a very long common border. If Russia were blessed with internal peace and the outlying preserves of North China and Mongolia were in the throes of anarchy Russia would certainly take the precautionary measure of guarding her frontier. The circumstances being reversed it is not only China's right but her duty to see that the disturbances to the north of Manchuria and Mongolia and to the north and west of Chinese Turkestan do not affect the peace of the peoples living on the Chinese side of the line. This duty, which was apparent many months ago, was so completely overshadowed by the fascination of playing petty politics and of desolating the central provinces with coolie campaigns, which had seized upon both North and South, that it was completely ignored and has only become interesting since the question of defence has given rise to delicate diplomatic problems which have arisen between China and Russia, between China and Japan, and between China and the nondescript state of Mongolia ruled by His Holiness the Hutukhtu. Prompt action four or five months ago would have forestalled most of these problems and would have demonstrated to the ever watchful world that China was at last awakening to sense of national responsibilities. The opportunity was of course ignored.

Four or five months ago the Russians in China would probably have been as willing to waive the terms of the Chinese-Russian-Mongol agreement, which stipulates that Chinese soldiers cannot operate in Outer Mongolia, as they were to welcome Chinese intervention in Harbin. The priest king of Mongolia, the Hutukhtu, would undoubtedly have preferred Chinese to Bolsheviks, but in spite of the appeals from Chen Yi, the Chinese resident in Urga, and the reports of armies of armed enemy prisoners preparing for a descent upon Chinese territory, which were then accepted in good faith, Peking showed no disposition to act, Peking waited until the Bolsheviks had made their influence felt in Urga, Uliassutai, and Kobdo, until the Hutukhtu had perforce put on Bolshevik war paint, and until such an organization had been effected among the Russians in China that the latter began to hope for the reestablishment of some sort of Russian Government in Siberia and of preserving intact for that prospective government the privileges enjoyed by Russians in Mongolia prior to the collapse of the Kerensky government. After having waited so long the Chinese do dispatch a body of cavalry toward Urga to support Chen Yi, only to have to halt them in mid-desert in compliance with a protest from the Russian Legation which, though outlawed by the present Soviet régime, represents in the hopes and plans of the moderates the hypothetical Russian democracy of the uncertain future. Chen Yi's position in Urga

as a diplomat at the court of the unhappy Hutukhtu must be a difficult one. It is his painful duty to enhance Chinese prestige and influence with the Mongols on behalf of a government which remains oblivious to his existence until he and the monarch whom he must persuade to put his reliance in Peking find themselves in the center of a Bolshevik camp.

The Chinese Government with this result of their failure to improve upon their opportunities before them are now patiently waiting for similar developments in Chinese Turkestan, which is one of the tinder boxes of China. They are waiting for the Bolsheviks, and the German agents who herd with them, to drop a spark in the Moslem communities of the Northwest so that the younger generations in the East may be treated to the prospect of such an appalling conflagration as their fathers witnessed in the Tung Chih period. They want to give the armies of Tsao Kun and Chang Chin-yao, which retire pleading exhaustion after having raped the women and butchered the old men of a few Hunanese counties, an opportunity to test their prowess against the Mohammedan forces which dammed the rivers of Kansu with dead Chinese soldiery sixty years ago.

The activities of the Russian moderates in Manchuria and the Amur country generally, who have been organizing to combat the Bolshevik movement in East Siberia also create diplomatic difficulties for the Chinese. The Bolsheviks object to these Russian moderates organizing their provisional government on Chinese soil and to their use of a Chinese city as their military base. These activities make China nervous also and Peking would certainly be only too happy to protest in compliance with the Bolshevik objection, if the leaders of the moderate movement, the Russian Minister, General Horvarth, and Colonel Simionov were not championing the cause of the last recognized government in Russia, the Kerensky government, with which China was nominally allied and to which she is under some moral obligation to render assistance when opportunity affords and to provide sanctuary. Except as individuals in the suite of Russian counter-revolutionaries, the Chinese have little excuse for interfering in Russia's internal affairs, but the Russians themselves have a perfect right to meddle as much as they like with an unrecognized Government, and since they claim to support the Allied cause, and since China is not a neutral, it is difficult to see how China is going to object to giving these people shelter or to their organization of expeditionary forces on Chinese soil. If a similar chaotic state existed in Canada for instance, and if a minority party, supporting the war aims of the Allies tried to restore order and to establish a pre-Allied government, their refugees would certainly be given every facility at this moment in the United States to organize expeditionary forces. The Chinese who object to Russian activities in Manchuria simply do not realize that China is a belligerent.

Baron Sakatani on Loans

Baron Sakatani, one of Japan's foremost financial experts, has recently completed a tour of the Yangtze Valley and has returned to Peking after visiting a number of provincial officials, coming into contact with Shanghai's wealthy commercial leaders, and after a cursory study of the currency conditions in the various communities through which he has passed. The Chinese are extremely suspicious of any Japanese who comes to China in any capacity and they are still more suspicious when a Japanese visitor is known to be a most valuable man to his own Government and a diplomatic agent fully qualified to enjoy the dignity and comfort of an appointment in any European capital. It appears to the Chinese that Japan in sending such a man is concentrating upon some very important objective, something very much to the interest of the Japanese Government; and this is sufficient to make the Chinese nervous. An additional tremor

went through the Chinese frame recently when Baron Sakatani was quoted by a northern paper as saying that he favored the immediate introduction of a gold standard. This was interpreted to mean a Japanese standard, and the Chinese saw visions of complete Japanese control of the Chinese money market and a consequent monopoly of trade with China.

Upon his arrival in Shanghai Baron Sakatani discovered that he had been quoted as favoring the introduction of a gold standard before any standardization of the complex silver and copper mediums of exchange was attempted and he hastened to deny that he had any such scheme in mind and to assure his interviewers that he agreed with China's various authorities and advised that great reforms would have to be made in the existing currency system before it would be possible to superimpose a gold standard.

In the course of his various interviews Baron Sakatani also took particular pains to impress upon those whom he met that he had no sympathy with the indiscriminate advancement of money by Japanese bankers to Chinese officials without authority from any representative Chinese body, without security, and without any stipulation as to the way in which the funds advanced are to be expended. Most of the money raised during the last few months has been devoted to military operations in Hunan and the Yangtze Valley or has been given in lump sums to wavering Military Governors to cement their loyalty. This in spite of the fact that the nominal purposes of the various funds advanced have been redemption of paper money, currency reform, administrative reform in the provinces, expansion of communications, and what not. Arrangements have been loose. A military governor requires very little authority to negotiate a loan in exchange for certain local concessions and the Central Government requires no authority but its own limited approval to make national concessions. Neither do the Japanese money lenders worry much about security. They have a contract signed and sealed, register it at the Legation and trust to the Legation to do the rest. If they cannot collect, the Legation can. A writer in a Shanghai contemporary states that since the commencement of the war in Europe China has obtained eighty million dollars from Japanese sources, exclusive of a number of small loans recently obtained or agreed upon but not consummated.

Of this Baron Sakatani expresses the severest disapproval. He says that China needs money to finance a currency reform scheme but that it is folly to start anything until there is some guarantee that the money advanced will not be promptly devoted to carrying on civil war or be doled out to the Peking Government's provincial dependents. One of Baron Sakatani's colleagues who was traveling with him enlarged upon this statement. He said that the Baron was interested in China, that he was eager to see China develop a sound government and a modern currency system because it was to the ultimate interest of Japan. He condemned the policy of the Japanese money lenders as shortsighted and ruinous. As opportunists, with no thought for the future they were sapping the financial strength of the one country which should be Japan's best market in the future and, when developed properly, her best source of raw materials. It was a case of killing the goose that lays the golden egg. Those Japanese who are farsighted enough to realize how great an asset the trade of a financially sound and a well governed and well developed China could be to Japan are not only opposed to the opportunists who are supporting the present insane inter-provincial wars, but are also opposed to the exclusionists who would establish a Japanese monopoly of trade and political influence in China, because they fail to realize that a nation cut off from free commercial and political intercourse with other peoples is bound to be stagnant and unproductive.

This is a summary of the doctrines preached by Baron Sakatani and the members of his following on his recent tour in Central China, and it is a perfectly fair and sound doctrine. The Chinese will not give Baron Sakatani credit for sincerity in the expression of such opinions until he has demonstrated his sincerity. They feel that his presence here is suspicious, that he is about to be forced upon an unwilling Government as an employee with more executive power than any adviser has ever been granted, which makes his presence more suspicious still and

confirms the people in the conviction that he has come to gain control of Chinese finance for Japan. In dealing with a man of Baron Sakatani's caliber, it is probably much fairer to assume that if he can preach a sound economic doctrine he has sufficient understanding to appreciate it, and that it is just as well to take his sincerity for granted until his statements are shown to be other than sincere.

Education and Politics

The Chinese say contemptuously of their own people "the ordinary Chinese is just one gasp better than a corpse," implying that you can only tell a live Chinese from a dead Chinese by the breath that is in him. An overwhelming percentage of China's great population does lead a most restricted and narrow life in a miserable environment, with no intellectual exercise other than the pursuit of food through the medium of some miserably monotonous and fatiguing form of heavy labor; but although there is so little intellectual stimulus and therefore so little showing of intelligence among the Chinese common people, it is doing them a grave injustice to think that they are not capable of responding to an intellectual stimulus. The mind of the Chinese lout has a capacity which is anything but loutish, and if ninety-nine per cent of the common people in China impress the scholarly class as "breathing corpses," it is chiefly because the scholarly class has selfishly monopolized the intellectual stimuli, has created in the past a corner upon brains, books, and thought, and has shown no originality and no interest in recent years in the task of supplying the people with something to think about and in guiding popular thought along the proper channels.

The average illiterate Chinese who knows no geography but that of the immediate neighborhood which he has traversed on foot, who has had no experience of politics beyond a possible encounter or so with a corrupt district magistrate and his overbearing satellites, who recognizes no obligations or duties outside of his immediate family group and no loyalty to any other person than the head of the family, makes a poor unit in a democracy. Yet this same individual, transplanted to a Chinese colony abroad—no matter where—develops a thousand interests and enthusiasms, develops a generous patriotism, develops loyalty to the community in which he lives, respect for instead of fear of authority, and, above all else, cultivates a passionate devotion to China's interests. The Chinese abroad are China's most devoted champions. To those who are familiar with all phases of Chinese life and who have been watching recent events, it becomes more and more apparent that there will be no democratic government in China that will not be a mere lacquering of rotten wood until the masses of the people are raised above the intellectual status of breathing corpses. All the loans in the world, all the advisers whom the Occident could furnish, all the elaborate schemes of reform, and all the trade that could be built up would supply relatively puny needs in China compared with the need of education.

There are places in China where the citizens of the Chinese Republic have not yet heard, after seven years of political turmoil, that the Manchus have fallen. One cannot expect the inhabitants of such a district to take a very intelligent interest in the impending presidential elections. It would be a safe wager to bet that ninety-five per cent of the population of Kiangsu province, one of the most enlightened districts with the best communications in China, do not know who represented Kiangsu province in the Parliament which has played such a dramatic part in the young Republic's history. You cannot expect such people to have a very firm control over their parliamentary representatives or to realize when the politics of the Kiangsu men coincide and when they run counter to the districts which they represent. The state of things which now exists in China would be wholly impossible, even for a day, if one third of the Chinese people knew how and why they came to exist. One cannot cultivate much

sympathy for a people which will permit a few individuals to peddle out national rights and liberties in exchange for the funds with which to finance campaigns of murder, rapine, and sham warfare in their own private, political interests; but on the other hand it is palpably unjust to hold the masses, to whom news percolates in a vague and misleading form months after the event, responsible for conditions such as these when they have never been taught that they have either the right to know of such matters or the power to check and control them. And yet the only possible reform of such conditions, unless we are to concede the immediate necessity for foreign intervention, is an awakening of the people to their powers and responsibilities.

The foundation for a spirit of patriotism and for an interest in national and international affairs is given the citizens of every civilized Occidental country in its public schools; and at the same time the school children in Occidental countries are all made sufficiently literate to follow public events intelligently through the reading of newspapers, magazines, and books. These institutions—the school and the press—are the root and source of national strength in every Western land. Germany might have been able to have started the present war with an illiterate population, but she could not have sustained it; and it would have been utterly impossible for the Allied countries either to have countered Germany's movements in the first instance, or to have sustained resistance in the second instance, or to have won the support of America and other nations removed from the immediate scene of battle in the third instance, without the popular school-inspired understanding of the events of the past four years or without the powerful support of the press.

We have come to take these institutions for granted in the West. We think no more of the services which the schools and the press do the nation than we do of the services which the grocer, the butcher, and the tailor do the individual. And in our impatient contemplation of Chinese affairs, we fail to realize that China derives little service from an impoverished and inadequate school system which is just beginning to find itself after the collapse of the old systems of instruction, and still less service from a struggling press, which is for the most part subsidized by the official class, which is the democracy's worst enemy. Perhaps one male adult in every 800 in China sees a newspaper, and perhaps one male adult out of 8,000 in China reads the newspaper with sufficient ease and understanding to take an interest in public affairs. In the relative proportion of the populations of America and China, the former educates about twenty-four times as many children as the latter and, needless to say, does it more thoroughly. This would induce us to believe that China is going to derive any great benefit from the education of the rising generation, and the worst of it is that China could not afford to wait for the youth of this generation to mature. China's need of a fundamental overhauling, inspired by a popular knowledge of public affairs and a sense of popular responsibility in the conduct of a democratic government, is immediate.

If this great need were realized by the official classes in China a tremendous change could be worked in the popular attitude toward governmental affairs and international relations in a very few years; for the remnants of the old paternal official system still afford an excellent medium for transmitting propaganda and for influencing the people in all manner of ways direct and indirect. Something of this sort was tried during the early days of Yuan Shih-kai's presidency, but the reactionaries discovered that it was not in their interest, so the business of enlightening the people through proclamations, lectures, and pamphlets, read and distributed in the schools, was stifled. If the patriots of China had, during these seven years of nominal republicanism, devoted their whole energies and their wealth to the dissemination of political knowledge among the people, instead of indulging in the pleasant and fascinating game of conspiracy, a real democracy would be much nearer at hand than it is at present. All that the people of China have learned of political economy and practical politics since the fall of the Manchus they have learned through bitter and trying experiences, and their trials have filled them with anything but hope for the future.

It is almost as presumptuous to venture a constructive suggestion in China as it is to voice a prophecy. China abounds in self-

appointed "authorities" whose particular office is to keep a sharp lookout for schemes and suggestions of reform and to laugh them out of countenance as soon as they appear. For this reason most criticism of Chinese affairs and events is destructive and, such criticism being absurdly easy in this land of nebulous institutions about which no one knows very much, it appears in great volume. Another discouragement to constructive work is the Chinese penchant for wagging their heads dolefully over any scheme in which they foresee anything more strenuous or laborious than voluminous discussion. They are always willing to talk, elegantly, fluently, and endlessly, but a scheme that entails action and affords little opportunity for talk, impresses the Chinese dilettante as crude, crass, and material. Nevertheless it will do no harm to risk a few suggestions.

Assuming what we have been trying to demonstrate—that China's most immediate need is the political education of the masses—the dissemination of political knowledge should be the present concern of the Government which claims to be the manifestation of democracy in China, and at the same time the concern of the radicals, chiefly of the South, who spend so much time proving that the present Government is not a manifestation of democracy. The Ministry of Education should be provided with enough funds to establish a publicity bureau, with branches in every province and with staffs of competent Chinese writers and journalists to collect and digest all official news, put it in a readable form in simple Chinese, and comment intelligently upon it. News and its interpretation, minus political bias, could be sent out from Peking and reported to Peking by letter or by wire, and from the provincial and central bureaus could be given the widest possible publicity by supplying the copy free to newspapers, by supplying it to schools, and by posting it throughout the towns and villages as official mandates and documents are now posted. Pamphlets upon political rights, political duties, the theory of democratic government and the like, could be prepared in Peking and sent out to the provinces weekly or monthly to be read in the schools, supplied to the newspapers, and to be sold in street stalls at a minimum charge, just as Christian literature is now sold. Newspapers could be supported in backward districts and supplied with news by the provincial bureaus with both news and editorial matter of metropolitan caliber.

As soon as such an institution became influential and therefore valuable to the politicians, who are keenly appreciative of what little publicity there is, it would be in imminent danger of becoming the political organ of whatever party was in power in the capital or the particular provincial capital which was furnishing news. A publicity bureau which simply doled out scholastic essays on the theory of government would be of little value. To take a real grip upon the people it would have to deal with current events and explain them, and as soon as it began this work it would be a convenient medium for party propaganda. For this reason there would have to exist some other institution outside government control which would enter practically the same field, could command very much the same resources and would still be independent of political influence. To this end a society formed among patriotic officials and business men, for the propagation of political knowledge, with agents in every *yamen* and ministry—secret agents, if need be—and secretaries in every large center to condense, write, and forward news, and to prepare literature in a cheap form upon political subjects, would be exceedingly useful. In every circle of Chinese officials there are men who are passionately devoted to China's interests, but who in the ordinary course of events find that, because they are cogs in the ancient political machine, they have to look after their own interest first. The idealist in a Chinese *yamen* who voices his ideals and fails to play the political game usually ekes out a miserable existence copying documents. The official called upon by an official publicity bureau would furnish the kind of news and the interpretation of it which would fit in with the schemes of his party or clique and would therefore forward his personal interests, but the same man, as the anonymous member of a society for the dissemination of political news and theory among the people, would tell a very different story if asked to report to his society upon political conditions or current events. It would not be at all difficult to enroll in such a society the leading merchants, the younger men among the intellectuals, and a few

officials throughout all China, and to use them as a medium for strenuous propaganda of a nonpartisan character. Such an institution could not very well be a secret organization, but the sources of information and the means of transmitting it could be confidential, which would be impossible with a government bureau. Much good work could also be done through the chambers of commerce and the provincial and trade guilds.

A Chinese writer has said that the Chinese is like a dusty mirror. The dust on the mirror does not imply that it is dull, but that it has not been used. Brush the dust of ignorance off the Chinese and put patriotism before him and he will reflect it. The Chinese are blessed with great intellectual curiosity, so that there is not the slightest danger that they will ever ignore any intellectual pabulum that is put before them. Some one, however, has to provide the Chinese masses with the material for thought if they are ever to be expected to think sanely and seriously about public affairs. And until the people can be brought to interest themselves in politics and to put a check upon an official class which is now wholly irresponsible since Parliamentary control does not exist, the Republic of China will continue to be nothing more than a grotesque parody upon the democracies of the Occident.

The Postal Maps

We have recently received for review a map of Kiangsu province published by the Chinese Postal Service from the Commissioner's office at Nanking. This map, which gives the names of cities and waterways, and in some localities small towns and villages, in both English and Chinese, is a good size, is neatly lithographed, and is particularly clear. Although many of the minor waterways, which do not figure in postal routes, are omitted, in some districts the mapping of courier routes gives the highways and the location of small towns in much more detail than ordinary maps. Every contribution of this sort is appreciated by those who are interested in Chinese cartography because, although map making has been in progress for countless centuries, and although many extensive surveys have been carried out along the main routes of commerce and near the large cities, the published detail maps of China are still in effect no more than outline maps and there is no map of all the territories of the Chinese Republic in which the experienced traveler in China cannot detect numerous errors and to which he cannot add important details. The post office, like the missionary organizations, has particular facilities for checking the errors in existing maps and for adding to the recorded knowledge of Chinese geography. The practice of publishing the information collected by the post office in map form and of making it available to the general public by putting the maps on sale at a nominal cost is therefore appreciated by all cartographers.

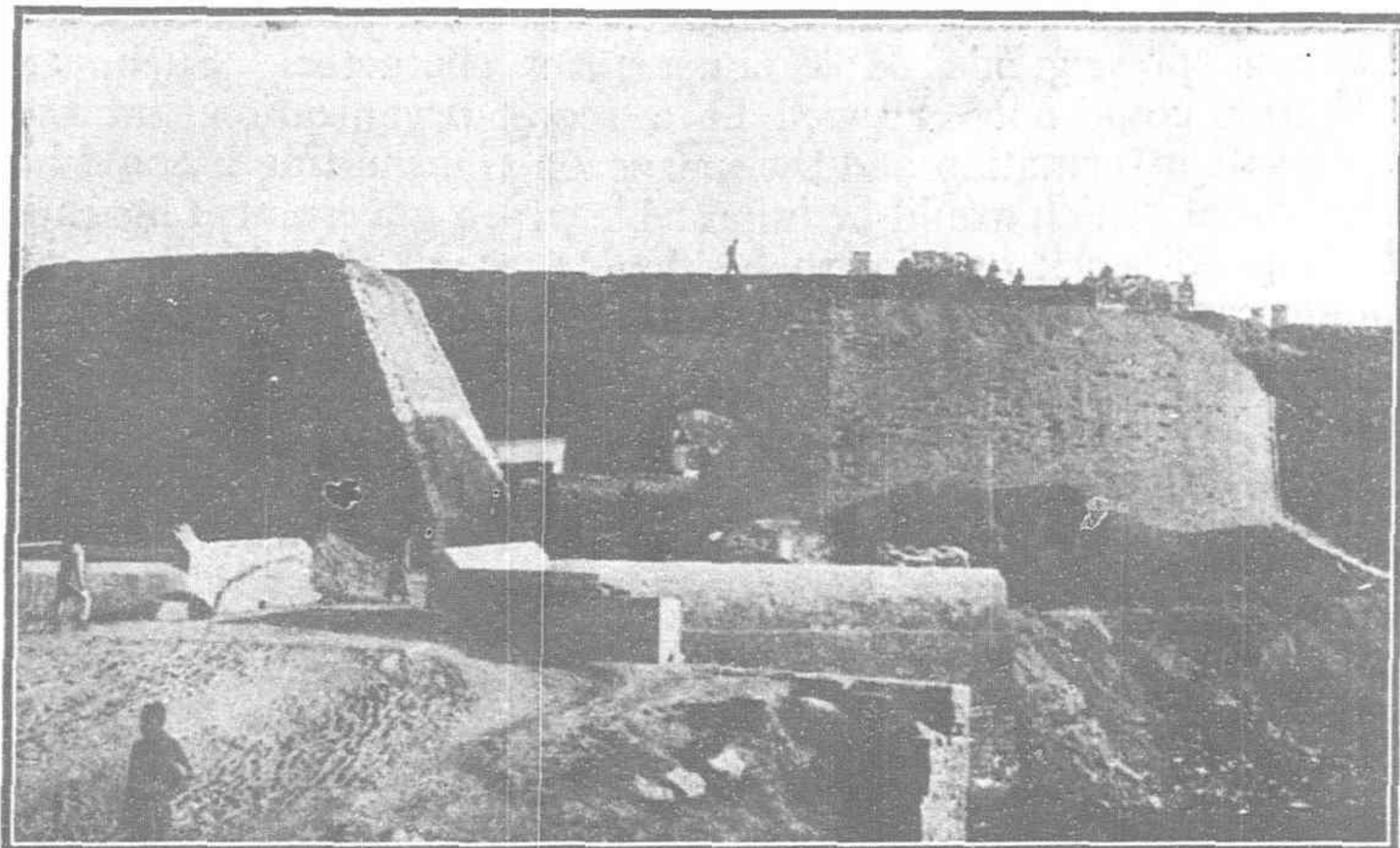
The provincial maps may be obtained from the central post offices in the various provincial capitals and the Kiangsu map may also be obtained from the Shanghai post office. The charge for the maps is twenty-five cents each.

A few Japanese have been known to interest themselves in refining soda which is found in Mongolia, but none of them has set about it in the right way. They merely secured the right to the soda for the purpose of selling the concession at as great a profit as they could clear from willing buyers.

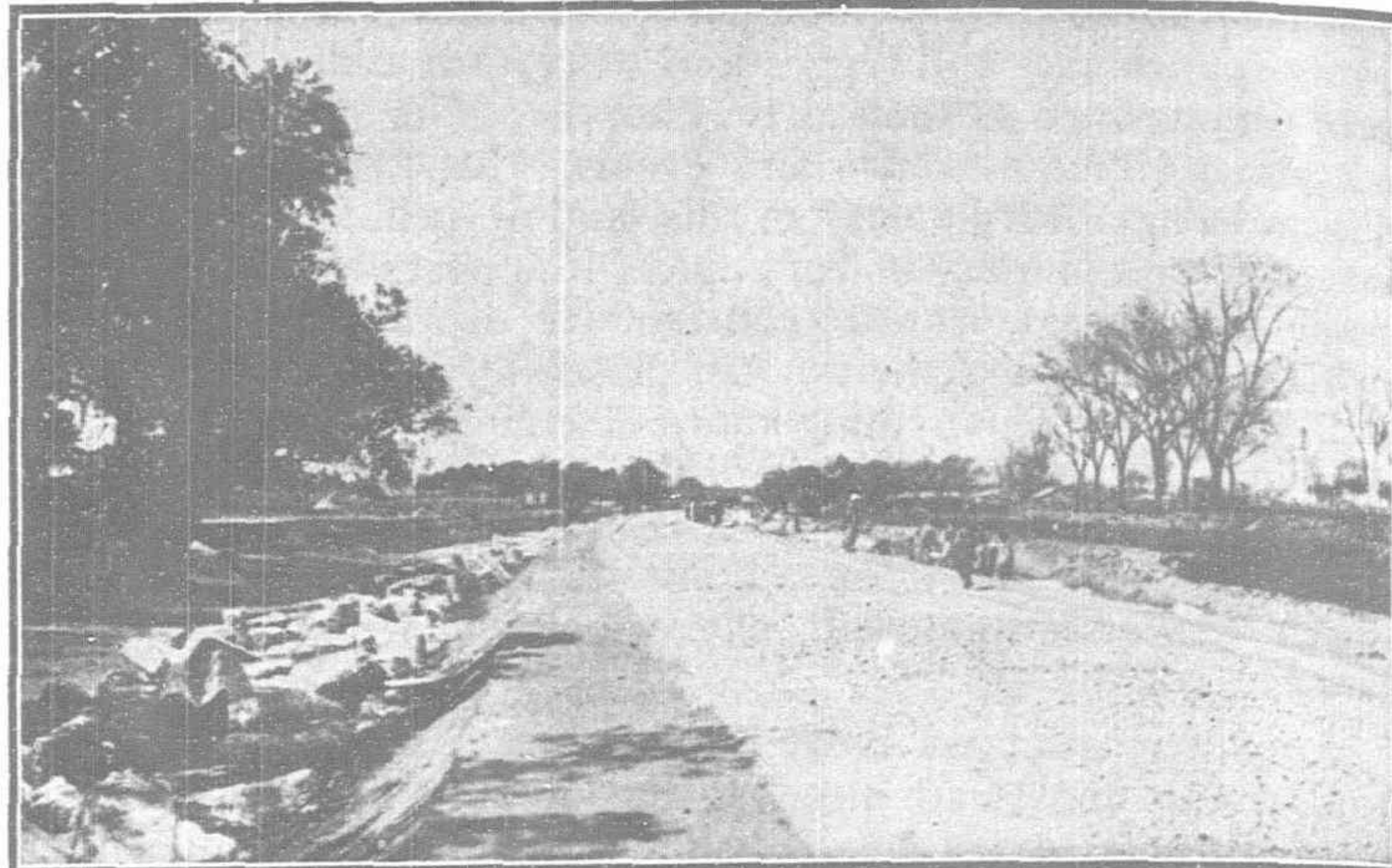
A new firm has been formed under the style of the *Sankuo Kungsu*. The district the new firm has in mind is situated in the principality of South Kuoerhlossu.

A Japanese member of the new firm visited Changchun and successfully negotiated the purchase of the soda district with the *Tienhui Kungsu*, which holds its working concession.

It is planned to found at Changchun a refinery capable of putting out 10,000 tons per annum, the work to be commenced as soon as the thaw sets in.



METALLING A TWELVE-FOOT STRIP THROUGH A TUNGCHOW STREET



A BREACH IN CONSERVATISM. A NEW OPENING FOR THE HIGHWAY IN A TUNGCHOW BASTION

Progress in Road Building

When one takes into consideration the very scant mileage of the Chinese roads which a motor car can negotiate, the number of cars in use in Shanghai, Tientsin, and Peking is astonishing. One cannot go more than fifteen miles from the Shanghai water front in a motor car nor farther from the Peking city wall than ten miles, unless the results to the car are a matter of indifference, yet in Shanghai there are now about two thousand cars in service and in Peking approximately three hundred. In these Chinese cities all other conveyances are slow, cramped, and dirty, while a private motor car insures the owner speed, privacy, and immunity from contact with the diseased and dirty *polloi*, so that all who can afford it use cars even though there is so little opportunity to get out into the country with them and no opportunity to travel in them from city to city.

The keenest appreciation is shown, however, of every little stretch of road that is built and it is quite safe to assume that every mile of macadam road constructed in China brings in quite a few new cars. In every other country the extension of motor car communications has had an appreciable enlightening effect upon the rural communities, has helped to raise rustic villages to the status of towns and has brought prosperity and new trade openings to many communities which were thoroughly somnolent before respectable roads were built into them. Certainly the same effect may be expected in China, and the motor tourist may in another generation be able to claim a good share of the credit of reforming and modernizing this country.

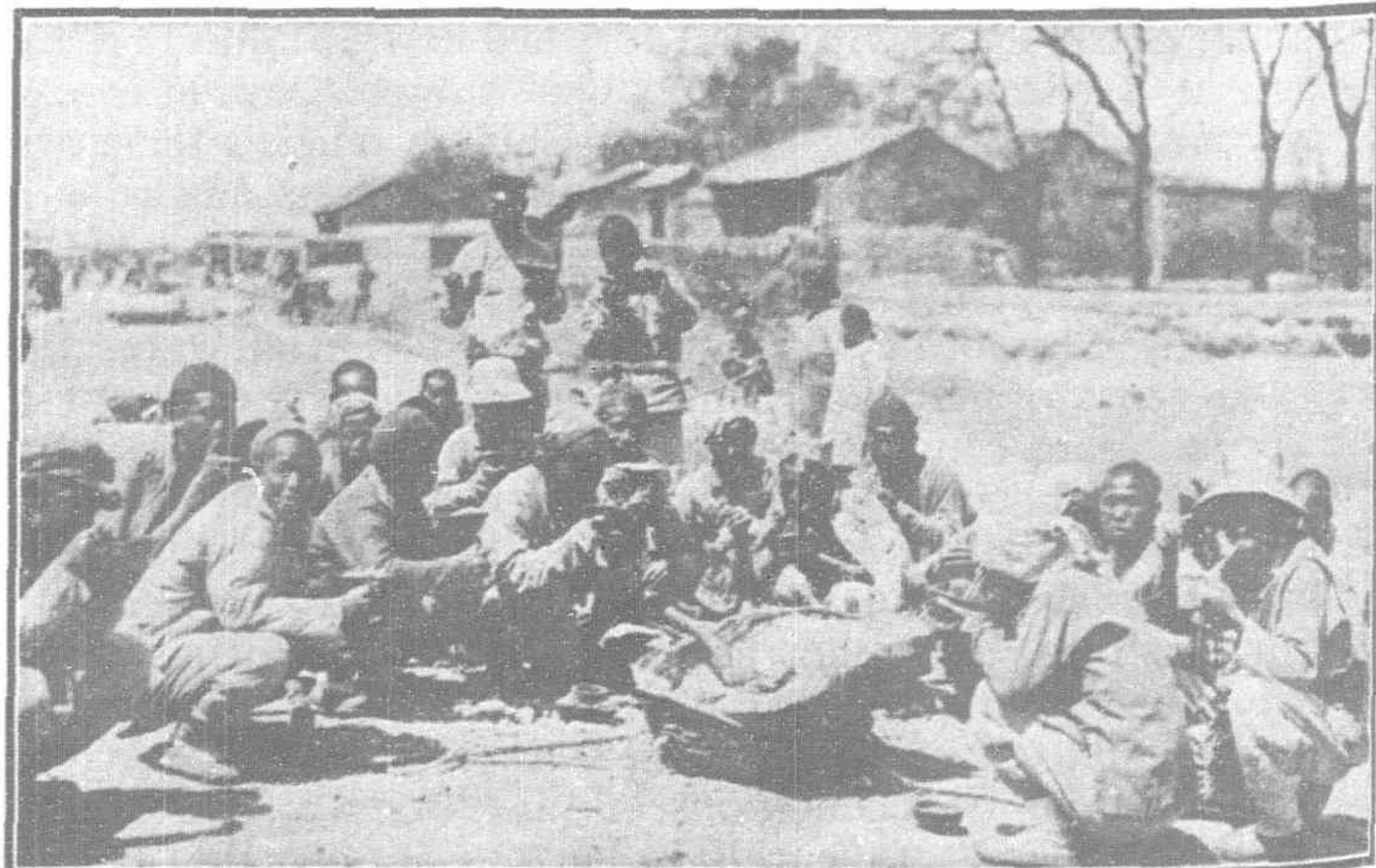
The north of China is exceedingly conservative, but the advantage of good roads makes a stronger appeal to the Northerner than to the Southerner because the former has had to find some accommodation for cart traffic, which the latter does not possess, for several thousand years, and also because the waterways are not so numerous or so satisfactory.

When the Red Cross had to devise a means of relieving the suffering of the flood victims in Chihli, it was wisely decided to expend the available funds by employing the refugees upon the construction of a highway from Peking to Tungchow, thereby completing a section of a prospective highway from Peking to Tientsin. The Chinese Government subscribed something more than half of the needed funds and the work of tearing up the old Imperial stone highway was commenced last Autumn, as has been described in the February issue of the REVIEW. The work is now nearing completion and the prospect of the benefits to be derived has inspired the Chinese to set to work on the opposite side of the city, where a road is being built from the Ping-tze Men to the Western Hills. These progressive undertakings stand in marked contrast to the political ineptitude of Peking and, as communications inevitably bring enlightenment and reform, they may be regarded as a counteractant force.

The accompanying illustrations supplement those which have already been published and show the progress made upon the Peking-Tungchow road that has been made under the direction of Chief Engineer R. A. White.



A SECTION OF THE PEKING-TUNGCHOW ROAD NEARING COMPLETION



A GROUP OF THE FLOOD REFUGEES WHO HAVE BEEN DOING THE WORK

ENGINEERING, FINANCIAL, AND INDUSTRIAL NEWS

RAILWAYS

South Manchuria Railway Express Suspended.—The South Manchuria Railway Company has given notice that, owing to the suspension of the Express Train Service between Europe and the Orient, with no immediate prospect of its resumption, all the Express Trains in South Manchuria and Chosen have been discontinued until further notice.

Through Parcel Traffic.—Hitherto no through passenger tickets have been issued between the South Manchuria Railway and the Ssuningkai-Chengchiatun Lines. Not only the passengers have to buy tickets for the connecting Railway at Ssuningkai Junction Station before the train starts in forty minutes' time, they have to book their baggage also anew.

On and after June 1, through tickets between the two Lines are to be issued with the time of stop at the Junction Station being lengthened to one and half hours. Needless to add, the passengers' baggage will be looked after by the Railway people, and we further understand that a through parcel traffic will be inaugurated at the same time.

The Lung-Hai Railway.—There is a report of the taking up of the long delayed Lung-Hai Railway. In times of peace this railway was of absorbing interest but it was impossible to find out what was actually being planned by the real authorities. Several widely divergent routes had been most carefully surveyed but no one has ever been able to say where the road would finally reach tidewater. It is a matter of common knowledge that the whole amount of the loan was paid over to the Chinese Government but was used by President Yuan Shih-kai to put down the Second Revolution and has never been replaced. It would be interesting to know where the funds are to come from now. We understand the road is to follow the survey which runs almost due east from Hsuehowfu.

Freights and Roubles.—Officials of the Chinese Eastern Railway were sent down to Kwanchengtzu and Changchun to make investigations on the ground as regards the Railway freight rates. Owing to the rise of roubles, only a small amount of goods is being forwarded to Harbin, creating a dearth of supplies at Harbin.

Landslide in Manchuria.—An extra goods train in Antung was running through a cutting between Tsaohokou and Tungyuanpu at some seventy-eight miles from Mukden at 6.05 p.m. May 20 when a land-slide occurred. The locomotive was derailed and the first and second cars were badly damaged; the third car was buried beneath the earth, while the fourth and fifth cars running up on the entombed one shattered it; the sixth car was derailed. Both driver and stoker escaped unhurt.

Osaka City Tramway.—The authorities of the Osaka Municipality have issued particulars

of the operation of the municipal tramway as requested by the Investigation Committee and the report shows the present condition of the department clearly. Here is a brief statement:—

Number of Cars.—On the 15th of March, 1918, the city had 450 single truck cars and 150 bogie truck cars, the total being 550 out of which 380 cars are running daily. It is hoped to increase this to 420.

Number of Staff and Employees.—948 Conductors and 800 Motormen (or 1,748 in all) are employed, and 500 pupils are under training. At the end of June they may be increased to 2,150 men for 450 cars. The traffic is increasing steadily and 450 cars will give the citizens satisfaction.

Number of Cars Running.—On the 13th of March, the South-North line had a maximum of 71 cars running (between 4 and 5 p.m.) and Sakai line 73 cars running (between 4 and 5, and 5 and 6 p.m.) that is to say a car runs every 50 seconds. On a holiday (15th of March), the former line had 77 cars (between 2 and 3 p.m.) and Sakai line 80 (between 1 and 2 p.m.). It is expected to have a car running every 40 seconds towards the end of June.

Accidents.—1915, 2,016 (9 deaths and 3 disablements); 1916, 2,282 (8 deaths and 1 disablement); 1917, 2,011 (11 deaths and 2 disablements); 1918 (in January) 258 (2 deaths).

SHIPPING

Shanghai's First Concrete Ship.—A 125 ton ferro-concrete ship was launched by the Yangtzepoo Dock for Arnhold Bros. and Co., Ltd., Friday May 24. Vessels of this size can be turned out in approximately three weeks. The dimensions and other particulars of the boat are as follow: Length, 65 ft.; beam, 15; moulded depth, 6.6; twin screws, 30 H. P. "Speedy" kerosene motors; speed, about eight knots per hour; thickness of hull and deck, 2½ in.

Windjammers for the Orient.—Mr. L. Everett of Shanghai, vice-president and general manager for the Far East of Struthers and Dixon, Inc., ship agents and operators, has opened offices in Manila and has announced that four big sailing vessels of the company will be used in Pacific trade. The first left San Francisco March 9. The Monongahela leaves San Francisco late this month, and will be followed by the Parahoc and the Moshulu. The ships allotted by the Federal board have a tonnage capacity of 20,000 tons and preference will be given cocoanut oil and hemp from the Philippines for cargo.

The head offices of the company are San Francisco.

Tenyo Maru United States Transport.—The Japanese liner Tenyo Maru of the Toyo Kisen Kaisha service will enter the United States Government service as a troop-ship on its return from its present trip to Kobe.

New Seattle Company.—Japanese merchants at Seattle propose establishing a shipping company, probably under the style of the

Americo-Japanese Steamship Company, on a capital of Y.50,000,000.

The promoters intend to call up half the capital on the establishment of the new company to buy two steamers of 6,000 tons and to charter five steamers of about the same size. These will be employed for transporting cargoes between Japan and America, but the service will be extended to the South Seas and India later.

The head office will be located at Tokyo with branches at Seattle, Yokohama, Kobe, and later at Singapore.

Dutch Service Renewed.—The Nederland and Rotterdam Lloyd Royal Mail Line has resumed its service as before, with seven steamers. As the result of an arrangement which has evidently been made with the Allies, the Wilis, 8,000 tons, will arrive at Yokohama from Hongkong via Nagasaki about June 3, and the Rembrandt, 10,000 tons, will follow within a fortnight, according to a dispatch from the office at Hongkong received yesterday at the Wiersum Shokai in Yokohama.

The steamers which will be put on the service are the Rindjani, Oranje, Kawi, Vondel and Grotius and the two ships mentioned above, say the local agents.

It is also reported that the Netherlands Royal Packet Company has decided to revive the lines between Java and Japan and Java and Saigon. It has six 2,000-ton vessels, and will divide them equally between these two lines to import rice from Saigon, and to export sugar to Japan.

Four Dutch steamers now in Holland, averaging 4,500 tons, will soon be added to the Pacific routes. They will touch Australia, the Philippines and China. The vessels belong to the Van Ommeren Corporation. Headquarters offices have been engaged at San Francisco.

Daigen Maru Launched.—The Yokohama Ironworks launched the Daigen Maru, a steamer of 1,800 tons deadweight, May 8. This is the first steamer to be launched since the Ironworks were taken over by the Uchida Kisen Kaisha, of Kobe, last year. At present the Yokohama Ironworks have two stocks for the construction of vessels of a maximum of 5,000 tons. The management has lately undertaken the erection of another stock to build vessels of 8,500 tons.

Nippon Yusen Kaisha Dividend.—The Nippon Yusen Kaisha called a semi-annual meeting of shareholders Thursday, May 28, when dividends of 50 per cent per annum were declared. The company's gross profit for the term ended March 31 amounted to Y.47,170,263. Of this amount Y.2,355,563 is to be set aside as reserve against the depreciation in the fleet or other properties. As war profit tax at home and overseas Y.11,153,540 is also deducted from the gross profit. The net profit thus comes up to Y.33,628,329, again of Y.4,640,000 over the preceding term.

The Chefoo Breakwater.—The Chinese Government has agreed to make a monthly appropriation of Customs revenue to the Chefoo Harbor Improvement Commission of Tls. 111,400 during nineteen months from January.

Branches.		Appropriations made.
LEGISLATIVE		P.989,838.00
Philippine Senate		353,010.00
House of Representatives		636,828.00
JUDICIARY		251,026.00
Supreme Court		251,026.00
EXECUTIVE		1,684,950.00
BUREAUS UNDER THE GOVERNOR-		
GENERAL... ..		519,041.00
Bureau of Audits		339,536.00
Bureau of Civil Service		79,505.00
General purposes		100,000.00
DEPARTMENT OF THE INTERIOR		5,719,773.00
Bureau of Non-Christian Tribes		795,682.00
General Hospital... ..		632,440.00
Boards of Medical, Pharma-		
ceutical, Dental, and Optical		
Examiners		5,700.00
Executive Bureau		298,478.00
Bureau of Constabulary		3,947,473.00
Government Orphanage		40,000.00
DEPARTMENT OF PUBLIC INSTRU-		
TION		7,217,080.80
Bureau of Education		5,420,150.00
Philippine Health Service		1,672,930.80
Bureau of Quarantine Service.		124,000.00
DEPARTMENT OF FINANCE... ..		3,446,912.00
Bureau of Customs		2,002,044.00
Bureau of Internal Revenue... ..		625,380.00
Bureau of the Treasury		119,390.00
Bureau of Printing		720,098.00
DEPARTMENT OF JUSTICE		2,495,851.15
Bureau of Justice		131,750.00
Courts of First Instance, General		
Land Registration Office,		
and Justice of the Peace		
Courts		1,383,057.00
Philippine Library and Museum		181,212.00
Bureau of Prisons		757,380.15
Public Utility Commission		42,452.00
DEPARTMENT OF AGRICULTURE AND		
NATURAL RESOURCES		2,924,207.67
Bureau of Agriculture		900,466.00
Bureau of Forestry		339,800.00
Bureau of Lands		1,052,431.67
Bureau of Science		433,120.00
Weather Bureau		198,390.00
DEPARTMENT OF COMMERCE AND		
COMMUNICATIONS		7,539,600.00
Bureau of Public Works		4,857,120.00
Bureau of Posts... ..		1,842,900.00
Bureau of Supply		340,930.00
Bureau of Labor		276,710.00
Bureau of Coast and Geodetic		
Survey		221,940.00

Nippon Yusen Kaisha's Revised Tariff.—The Nippon Yusen Kaisha has recently announced a rise in its freight tariff on the Japan-New York line by extra steamers by 10-40 per cent, to be operative in June, in

UNIVERSITY OF THE PHILIPPINES.	739,200.00
PHILIPPINE NATIONAL GUARD ...	1,337,986.88
PUBLIC WELFARE BOARD ...	64,204.00
PUBLIC DEBT ...	2,087,500.00
EXTRAORDINARY EXPENSES ...	700,000.00
EMERGENCY BOARD...	1,000,000.00
GENERAL TOTAL ...	38,737,170.50

No Chinese Money for Russia.—A Peking paper states that owing to the turmoil in Russia, China has decided to postpone further monthly payments to Russia of two-thirds of the Boxer Indemnity, payment of one-third of which was postponed when the other Entente Powers agreed to the postponement of their indemnities.

Japanese Import Revenue.—The Japanese Finance Department reports that the receipts of import duties during April were Y. 5,185,383, an increase of Y. 2,303,225 over the corresponding month of last year.

Japanese Silver Coins.—A reduction in the size of 50 sen, 20 sen and 10 sen silver coins was announced by a Japanese Imperial ordinance recently, the reason being not only that the silver coins in use at present are rather inconvenient to carry but because of the practice of melting them into bullion, on account of the unusual appreciation in the market price of silver. The new silver coins will be smaller in size by about 1/100 of an inch than the present ones and will contain a smaller proportion of silver. The government intends to mint Y.20,000,000 in the three denominations in the course of the current fiscal year and gradually withdraw the old coins from circulation. The small paper notes, issued last year to supplement the silver coinage, will also be withdrawn. The amount of the paper 10 sen, 20 sen and 50 sen notes issued reached Y.43,580,000 by the end of April.

Bank of Canton Suspends Payment.—The Bank of Canton, says a report, has suspended payment since May 10, owing to the fact that the bank is unable to meet the excessive demands for conversion of money.

C. E. and M. Co.—The board of directors of the Chinese Engineering and Mining Co., Ltd., has declared an interim dividend of one shilling per share free of income tax for the year ending June 30, 1918.

Japanese Debentures.—The Industrial Bank of Japan has decided to issue industrial debentures to the maximum amount of Y50,000,000 about July or August for the purpose of overseas investments.

The debentures are to be underwritten by the bankers' syndicates in the Kwanto and Kwansai districts.

MINING

Korean Mines.—The mills of the Seoul Mining Company on the Suan Concession during the month of April treated a total of 15,400 tons of ore, resulting in a net recovery of Yen 203,890.00. Recent developments at our outside prospects Tong Ahm and Nau Chauri are very satisfactory.

Mitsui has Claim on Shuikoushan.—Some time ago Mr. Tan Yen-kai, in his capacity of

Shenchang of Hunan, signed a contract to sell to the Mitsui Bussan Kaisha here 6,000 tons of lead ore from the mines of the Shuikoushan hills, says a Peking paper. The Japanese authorities have now lodged information that the sellers, after the alleged receipt of the proceeds of the sale (\$250,000), have failed to deliver the goods to the Company. They demand that the Central Government should observe the contract signed by Mr. Tan, but their claims have been rejected by the Ministry of Foreign Affairs.

New Mining Concessions.—A report from Haichow, Kiangsu Province, has it that several new mining concessions have been granted the Japanese in the Haichow district. The cession of an iron mine is attracting most attention.

For months there have been persistent rumors that the Japanese had obtained a mining concession but denials were just as positive. The matter is settled by the notice of the Haichow magistrate that such is the case.

According to report the iron ore to be worked is the Iron Mountain, one of the northern spurs of the great Haichow mountain at whose base the city is situated. It has long been known that this ore existed and a mere novice could tell by its extreme weight that it was rich in iron. The location is ideal, being only about a mile from a good tidal stream into which large ocean junks can come.

The proclamation also announced that a copper mine was to be opened at Nancheng, an old city miles east of Haichow, and gold mines at Yu San, 23 miles west of this city. What may be the richness of the two latter deposits we are not able to say but there is no doubt of an enormous amount of iron ore of high grade.

Rasa Phosphate Mining Company.—At a meeting of directors of the Rasa Phosphate Mining Company, held April 20, the following accounts for the current term were decided upon:—Net profits for this term, 1,548,000 yen, fund brought over from the previous term, 555,000 yen, total 2,100,000 yen; sinking funds against depreciation of property, 488,000 yen; carried forward to the next accounts, 675,000 yen; and dividends (40%), 450,000 yen.

Coal Output.—The output of Fushun coal in March reached 206,557 tons, an increase of 53,000 tons as compared with the corresponding period of last year.

The General Managers of the Fu Chung Corporation state that the sales of their Honan anthracite coal for the month of April last amounted to 75,686 tons.

The Kailan Mining Administration reports that the total output of coal for the four weeks ending May 18, was 249,127, while the total sales were 238,037 tons.

COMMERCE

Another Blow for Habutai.—The Japanese Department of Communications has just announced that no parcel post matter consigned to England will be carried through Canada. This is a fatal blow to the shippers of habutai and hemp braids because they have so far tried to send their goods by parcel post via Canada to avoid the inconvenience caused by the short supply of space on the European trade routes.

Japanese Needles in U. S.—Japanese competition in the American needle market is a reality and not a possibility, according to New York manufacturers and importers in conference in Philadelphia with members of the United States Tariff Commission.

Needle manufacturers from Japan, it is said, have been insistent in their efforts to learn America's requirements and during the last year and a half American manufacturers have been offered money for information along this line.

Referring to German needles, one witness before the commission declared they are cheaper at \$18 than American needles at \$13. American manufacturers, he said, will not make needles that the knitting mills want, but stick to the regular wire needles. This is one point, he continued, where German manufacturers have the advantage of the Americans.

Cotton Mill and New Roads at Wuhu.—There is being built in Wuhu a modernly constructed cotton mill which will install imported machinery and operate on a large scale. It is said that it will employ 2,000 or 3,000 workmen and is to cost about \$100,000 just for the initial buildings. The builder is a Chinese capitalist from Shanghai. This probably marks the beginning, in concrete form, in this part of the country of an industrial development which is practically certain to occur throughout China in the near future.

Some of the roads immediately adjoining Wuhu are being repaired with funds from the foreign interests represented in Wuhu. Many blocks of streets within the city have also been repaired by the city administration during the past year.

Effect of America's First Ban.—According to investigations by the Yokohama Exporters' Association in regard to the effect on Japanese exports of the first American ban on imports, the restricted articles which had been contracted for up to March 23, but had not been shipped from Japanese ports before April 15, are:—cotton goods, Y.4,100,000; toys, Y.1,200,000; miscellaneous mechanical goods Y.600,000; and food stuffs, Y.2,200,000; totaling Y.8,100,000. The estimate of orders that may otherwise come from America from April 15 to October 31 is given at Y.21,000,000; as follows: cotton manufactures, Y.9,000,000; toys, Y.3,000,000; miscellaneous mechanical goods, Y.3,000,000; food stuffs, Y.6,000,000. It may be recalled in this connection that importation to the United States of specified articles under ban was only permissible in cases where goods had been actually shipped from foreign ports before April 15.

North Borneo Trade.—The actual trade Imports of North Borneo for 1917 are valued at \$5,220,689 and Exports at \$9,198,831 being increases of 25.3% and 12.2% respectively over 1916.

Twenty-five years ago (1892) the biggest items of Imports were:

Rice, Grain and Flour	...	...	\$293,920.
Cloth	...	...	128,994.
Provisions	...	...	103,844.
Tobacco	...	...	56,502.

whilst Exports gave

Tobacco	...	...	\$1,040,674.
Sago	...	...	145,508.
Timber	...	...	70,423.
Gutta (wild Rubber)	...	...	59,253.

To-day (1917) the order in Imports is much the same but with greatly increased quantities.

Rice, Grain and Flour	...	...	\$1,397,883.
Cloth	...	...	607,550.
Provisions	...	...	411,610.
Ironware	...	...	353,883.

Exports, however, have altered considerably. Sago is now ninth, "Gutta" is a long way down the list. The order is now:—

Estate Rubber	...	...	\$5,439,123.
Tobacco	...	...	1,479,458.
Cutch	...	...	424,932.
Timber	...	...	375,387.
Coal	...	...	358,574.

Japan's Growth of Trade.—The following figures, from a series of tables published by the Yokohama Chamber of Commerce, show the remarkable growth of Japan's foreign trade in the last 15 years. The two tables give the exports and the imports to America and the total volume of trade each year.

Exports		
	America. Yen	Total. Yen
1903	67,237,496	146,580,438
1904	86,108,797	170,209,453
1905	79,033,651	145,585,292
1906	106,411,084	200,847,405
1907	107,613,639	205,888,534
1908	100,723,364	190,805,900
1909	109,261,620	205,163,108
1910	116,436,601	225,174,470
1911	114,203,672	228,081,797
1912	141,131,304	257,850,512
1913	155,894,822	316,821,388
1914	164,939,934	269,452,464
1915	166,657,124	305,953,588
1916	284,519,097	497,653,158
1917	399,360,873	667,065,145

Imports		
	America. Yen	Total. Yen
1903	17,455,810	110,878,968
1904	25,332,689	136,335,211
1905	46,537,081	188,716,413
1906	28,115,250	149,070,347
1907	32,808,929	172,485,633
1908	33,492,626	151,288,110
1909	24,894,832	131,000,369
1910	26,604,785	154,284,552
1911	37,203,166	175,834,648
1912	52,819,020	215,369,886
1913	47,906,631	235,102,105
1914	36,311,827	178,781,276
1915	34,555,795	140,350,624
1916	85,641,358	209,737,683
1917	149,443,591	287,267,699

Taiwan Sugar Co.'s Debentures.—The debentures issued by the Taiwan Sugar Refining Company to the value of Y.5,000,000 have been oversubscribed by Y.3,000,000. Subscriptions to the debentures in Taiwan reached Y.260,000.

Hainan Rubber.—The Acting British Consul at Kiungchow and Pakhoi reports that there are now in Hainan some two dozen small companies engaged in the cultivation of rubber. The produce is of high quality, the price at Singapore at the end of September being 110 dollars the picul. (The Singapore dollar, however, was at that time worth only sixty-five per cent of the local dollar.) One company of Nodda is employing five hundred persons, and has made, at the cost of 150,000 dollars, a road forty miles long in order to use carts for haulage. This company's plantation contains some 10,000 rubber trees. A commercial commissioner sent to Hainan by Chinese merchants in Malacca has stated that these merchants proposed to grow rubber in Hainan.

The coffee plantations in Hainan are also doing well, but coffee is not yet exported in bulk.

Among the products of the Hainan Consular district which received mention at the recent Agricultural Exhibition at Canton were:—Pineapple fiber, tree cotton, tobacco, rice, castor, and other oils, etc., from Hainan; pepper, aniseed, and lungan pulp from Pakhoi; rice and beans from Limchow; and yellow silk from Chinchow.

Waterworks for Yunnanfu.—A French society has obtained the contract for the construction of waterworks at Yunnanfu; the completion of these works is expected in the course of next year.

Phosphate Deposits on Rasa Island.—This small possession of Japan, which is some nine hundred miles southwest of Yokohama, has valuable phosphorous deposits estimated at ten million tons. In bearing qualities the ores are richer than those of Florida, U. S. A., or Tunis in Algeria. To-day 60,000 tons of phosphorus are imported into Japan annually by the Rasa Island Phosphorus Co., Ltd., of Tokyo. This company was established in 1913, and at that time only 11,000 tons were imported.

ELECTRICITY

Lungkou Electric Light Co.—The promoters of the Tsinan Motor Car Co., while pushing forward their plan to organize the company, are planning to found an electric light company at Lungkou. A report says that the two companies will be brought into being under the joint auspices of Government officials and private capitalists.

Mr. Sung-piju (of the Tungyi Business Co.) is to be Manager.

Lieut.-Gen. Chang Shu-yuan (in command of the Shantung Fifth Division), Mr. Ma-liang (Military Commissioner of Tsinan), the Directors of the Board of Administration and Finance, etc., are said to be among those interested in the new enterprises.

North Manchuria Electricity Co.—The North Manchuria Electricity Co., Harbin, since its recent reorganization, has a share capital of Y2,500,000, half which amount is paid up. The Oriental Colonization Co. is a heavy shareholder and, together with the other Japanese, they hold some 95% of the Company's shares amongst them.

The Company which owns two power stations, one at Pristan and the other at New Town, is serving some 30,000 electric lamps.

Electrical Development in Japan.—According to investigations made by the Department of Communications of the Japanese Government as to the Development of electrical enterprises in Japan during the past ten years, the amount of power used has increased four times in that period. Compared with ten years ago, electric power generated by means of coal shows an increase of 44 per cent, while that by the use of water increased 120 per cent. Ten years ago the latter was about one half the volume of the former. The present comparison is as follows:

Electricity generated by coal, 1882 enterprises, 3,932 K.W.; Hydro-electricity, 1,312 enterprises, 829,316 K.W.

The price per kilowatt is gradually decreasing in proportion to the increase of hydro-electricity. The average prices throughout show that the charges for electric lights by hydraulic generation has decreased by Yen 562 as compared with ten years ago, and those for coal by Yen 4.53.

The average charges ten years ago for ten candle power lamps was sen 73 for hydraulic electricity and Yen 1.267 for electricity generated by coal. To-day these charges have been reduced to sen 19 for hydraulic electricity and sen 75 for electricity generated by coal. The prices of power also decreased considerably.

Electricity in Japanese Factories.—Because of the wastefulness of coal by Japanese factories the need is keenly felt of generating electricity by employing the power which is thus sacrificed. After the outbreak of the European War electricity was employed in various industrial plants to a considerable degree. In 1914, electricity used for power was only 390,000 horse power per annum.

The latest report estimates the power used to-day at 620,000 horse power, which means an increase of 60 per cent. According to the report of the investigation of the Department of Communications, electricity was used in the following manner:

Use	Number of Places	Horse Power
Dye Works	11,467	94,97
Manufacturing by machinery and for iron works	14,064	176,746
Chemical Industry	5,826	90,376
Manufacture of Food Stuff	23,260	53,613
Mining and Refining of Ores	4,055	152,951
Miscellaneous Purposes	10,533	56,630
Total	69,205	625,286

Electricity used in the electro-chemical industry, otherwise than for power, totalled 79,000 kilowatts, which, compared with 30,000 kilowatts at the end of 1914, was an increase of 160 per cent.

Electric Light at Mengtsz.—The installation of an electric plant at Mengtsz was completed in July, 1916. Over 2,000 lamps from 16 to 50 candle-power have been installed in the Chinese city and the foreign quarter, the charges for light being \$1.20 and \$2.00 a lamp of 16 to 32 candle-power respectively, or \$0.30 a 100 watt hours if a meter is installed. An aerial line to supply the Koki mining center with electric current is in course of construction.

BRICK AND MORTAR

During a recent trip to northern China Mr. J. C. Witt, of Manila, visited the Great Wall at Shanhaikwan. "At this point," writes Mr. Witt, "the wall is largely composed of gray brick laid with lime mortar. The bricks have a porous structure, somewhat resembling pumice, and are much larger than ordinary building bricks. They are so weak that pieces may be easily broken off with the fingers. The mortar is pure white, under the exposed surface, and is much stronger than the brick. "The materials were of special interest to me because of recent research in ceramics and lime-burning at the Bureau of Science. A sample of each was taken and analyzed in this laboratory. The construction of the wall began in the third century before Christ, but was repaired eighteen centuries later. Therefore there was no means of knowing the age of the materials sampled, but apparently they were a part of the original structure. The general condition of the wall at this point is very good, as can be seen from Plate I, though near the top a number of the bricks are missing. Table I shows the analytical results.

TABLE I.—Analysis of brick and mortar.

Determination	Brick P. ct.	Mortar P. ct.
Loss on ignition	0.10	43.88
Silica (SiO ₂)	73.02	2.12
Iron and aluminium oxides (Fe ₂ O ₃ , Al ₂ O ₃)	18.96	0.44
Calcium oxide (CaO)	1.29	48.83
Magnesium oxide (MgO)	1.05	4.03
Sodium and potassium oxides (Na ₂ O, K ₂ O)	5.73	0.85

a. Analyzed by F.D. Reyes, inorganic chemist, Bureau of Science

"The brick is said to have been dried in the sun only. This was confirmed in the laboratory tests, because on ignition the material becomes dark red. If it had been originally burned in a kiln, the appearance of the wall would have been considerably different, and the strength and durability would doubtless have been much greater. Both the general appearance and the analysis of the mortar indicate that no sand was mixed with the lime. It is apparent also that the stone from which the lime was made was of good quality."